



‘Transparency would be lovely’: differences in information seeking and assessing behaviours between vaccine hesitant and vaccine confident mothers of newborns

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Abstract

Introduction. While today’s vaccines have robust scientific evidence supporting broad distribution and use, many individuals experience concerns about vaccination, resulting in vaccine hesitancy. Many factors may contribute to vaccine hesitancy including lack of trust in vaccination recommendations, misinformation about vaccine safety and effectiveness, and social norms. This study explored the information seeking and assessment behaviours of new mothers regarding infant vaccination schedules.

Method. Participants were recruited within two communities identified for low vaccine uptake. Semi-structured interviews were conducted with 32 mothers. Interview transcripts and researcher fieldnotes formed the data for analysis.

Analysis. Reflexive thematic analysis was used to qualitatively analyse interview transcripts, resulting in four overarching themes addressing the research questions.

Results. Vaccine hesitant mothers appear to have different information needs and subsequent information seeking and assessment behaviours compared to vaccine confident mothers in the same communities. Vaccine hesitant mothers reported consistently unmet vaccine-related information needs and described more intensive information seeking and triangulation practices because of these unmet needs.

Conclusion. Increased and creative vaccine communication opportunities are necessary to address vaccine hesitancy in target communities. Additionally, the relationship between mistrust and information seeking should be further explored, ideally in collaboration between information scientists and public health.

Introduction

Humans have attempted to protect themselves from illness and disease-related death for centuries. While various forms of intentional inoculation have existed for centuries, vaccine technology has improved significantly since the late 18th century (Plotkin, 2014). Today's vaccines have robust scientific evidence supporting broad distribution and use; however, many individuals experience doubts and concerns about vaccination and engage in *vaccine hesitancy*, the 'delay in acceptance or refusal of vaccination despite availability of vaccination services', leaving themselves and their communities at risk for preventable disease (MacDonald, 2015, p. 4161). Many factors may contribute to vaccine hesitancy including lack of trust in vaccination recommendations or services, misinformation or inadequate information about vaccine safety, and social norms. Researchers attempt to address and understand vaccine hesitancy from many disciplines, including information science, which has literature focusing on information and media literacy (Melki et al., 2023), perceived information overload (Chen et al., 2022), public health communication and human information interaction (Giese et al., 2021), misinformation (Roozenbeek et al., 2020), and the effects of social media on vaccine opinions (Argyris et al., 2021; Hagen et al., 2021).

This study approaches vaccine hesitancy by exploring the health information behaviour and information needs of new mothers. Through analysis of interviews conducted with mothers of newborns regarding British Columbia's infant immunisation schedule, this study explores 1) the information needs of vaccine hesitant mothers and whether those needs are adequately met, and 2) the information behaviours of vaccine hesitant mothers compared to those with vaccine confidence. By exploring these topics within a specific geographical and social context, this study aims to inform future vaccine communication research as well as improve patient healthcare experiences by expanding healthcare provider understandings of the complex information behaviours and needs relating to vaccine hesitancy in new parents.

Literature review

Vaccine hesitancy

Vaccination, as a preventative treatment for disease, has ample scientific evidence for its efficacy and overall safety for use. Despite near-universal public health consensus that the benefits of authorised vaccines outweigh the risks and established vaccination schedules from infancy to old age, some individuals experience doubts, concerns, or other forms of reluctance to vaccinate. The resulting delay or refusal of a particular vaccine or vaccination altogether for oneself or one's children when vaccines are available and accessible is considered *vaccine hesitancy* (MacDonald, 2015). While vaccine hesitancy has existed as long as we have documented vaccination efforts (Eddy et al., 2023; Smith et al., n.d.), the Covid-19 pandemic and accompanying widespread campaigns to vaccinate all adults, brought vaccine hesitancy into the public's consciousness.

Scholars have developed various tools to quantitatively measure vaccine perceptions, confidence, and hesitancy (Frew et al., n.d.; Gilkey et al., 2014, 2016; Larson et al., 2015, 2016; Opel et al., 2013; Sarathchandra et al., 2018). Researchers have also focused on identifying significant psychological predictors of vaccine perceptions; MacDonald's (2015) 3C model was expanded to Betsch and colleagues' 5C scale of psychological antecedents of vaccination which include *confidence*, *complacency*, *constraints*, *calculation*, and *collective responsibility* (Betsch et al., 2018). The World Health Organization now uses a revised model of MacDonald, Betsch and colleagues' work called the *WHO behavioural and social drivers of vaccination framework* (World Health Organization, 2022) to measure vaccine hesitancy.

Research aiming to understand vaccine hesitancy comes from various disciplines. Within political science and psychology, Lalot and colleagues (2023) tested vaccine hesitancy's association with *distrustful complacency*, a state within which an individual exhibits both low political trust in their

governing bodies and low concern regarding the virus/illness at hand. They found that individuals were generally more willing to accept vaccination when their concerns about the illness had increased, noting that 'anxiety prompts individuals to actively search for new information to deal with the perceived threats', (Lalot et al., 2023, p. 986). Immunology and public health researchers explored underlying factors for vaccine hesitancy by reviewing 22 qualitative studies, finding that 'parental vaccination decisions are complex and multi-dimensional', (Dubé et al., 2018, p. 989). In this review, the authors name several thematic complexities to vaccine hesitancy including individual risk perceptions of vaccination and non-vaccination, vaccine safety perceptions, and direct and indirect experiences with relevant illnesses. Anthropologist Brunson (2023), explored parental decision making about childhood vaccination and suggests that 'the process of parents' vaccination decision-making is complex, but... a general process does exist' p. 5467). While individuals move through this process at a unique pace, Brunson notes that *how* parents make decisions regarding childhood vaccinations is unique, requiring researchers to consider the originating beliefs and levels of understanding that lead to vaccine hesitancy in the first place. For instance, parents considering vaccination may be categorised as 'acceptors', 'reliers', or 'searchers', with each group having different information needs to be considered and addressed by public health providers. Other researchers note that opinions on childhood vaccination can change depending on positive or negative information seeking experiences (Greyson & Bettinger, 2022). These researchers note that having supportive healthcare providers who were able to mitigate mothers' fears through suggestions for addressing potentially traumatic vaccination experiences was appreciated by those who experienced vaccination-related fear and anxiety. Individuals who experienced increasing hesitancy over time were often found to have underlying concerns that were not adequately addressed within their healthcare experiences; this was regardless of whether participating mothers sought additional information or kept their questions to themselves.

Parental health information behaviour

The internet has become an essential resource for individuals seeking health information (Ashfield & Donelle, 2020; Jones et al., 2012; Meppelink et al., 2019). Online information seeking has become a key focus for scholars investigating parental health information behaviour. In their scoping review of parental online health information seeking behaviours, Ashfield and Donelle (2020) found that 50% of reviewed literature stated parents are looking online specifically for vaccination-related information. They found that online information seeking 'may have implications for the way that parents perceive the health and safety consequences of childhood vaccinations,' (Ashfield & Donelle, 2020, p. 4).

Research has also found online health information seeking to be key in parental vaccine decision making (Ashfield & Donelle, 2020; Ebi et al., 2022; Mossey et al., 2020; Tustin et al., 2018; Yudianto et al., 2023). Some scholars have connected online information seeking with increased health anxiety and vaccine hesitancy in some parents (Ebi et al., 2022; Tustin et al., 2018). In their comparative study of parents in Poland and Ukraine, scholars found distinct information seeking behaviours between those with vaccine hesitancy and those with vaccine confidence; vaccine confident parents often trusted a single source of information, usually a primary healthcare provider, while vaccine hesitant parents often sought information from multiple sources (Mierzecka et al., 2023). With distinct information seeking behaviours identified, scholars suggest that targeted vaccine communication strategies are necessary (Mierzecka & Łączyński, 2025). Researchers have also argued that primary healthcare providers have the unique opportunity to support parents as they make childhood vaccination-related decisions within clinical settings (Mossey et al., 2020).

Research questions

This study explores the information needs and behaviours of new mothers regarding infant vaccination and was guided by the following research questions:

1. What are the information needs of new mothers regarding infant vaccination schedules and are those needs adequately met by publicly available resources?
2. What information behaviours are exhibited by new mothers regarding their vaccine-related information needs and do these behaviours differ significantly between vaccine hesitant and vaccine confident mothers?

Methods

This study is grounded in a social constructivist epistemology (Creswell & Poth, 2025). Through this interpretive framework, the researchers sought to understand the complexity and breadth of experiences reflected in the research participants by acknowledging that everyone's experiences are unique and fully true to them, especially as these experiences are socially constructed within specific contexts, histories, and relationships. Reflexive thematic analysis (Braun et al., 2022) was chosen as a methodology that aligns with these epistemological groundings.

Study setting

This study is a secondary analysis of data that were collected for a collaboration between Fraser Health Authority, the body responsible for health in one of five geographic regions of British Columbia (BC), Canada, and researchers at the Vaccine Evaluation Centre at the BC Children's Hospital Research Institute. Within BC, health authorities provide healthcare services, resources, and policies for communities that exist within their purview. While healthcare is funded provincially, programming and policies of one's local healthcare authority can affect experiences and opportunities when accessing care. Funding for this study was provided by a project grant from the provincial immunisation committee to explore geographic pockets that had low uptake of routine infant vaccination despite availability of free vaccines and vaccination clinics.

The provincial recommended infant immunisation schedule includes multiple vaccinations given at two, four, and six months of age, followed by a childhood vaccination schedule offered from twelve months through adolescence. The original collaboration focused on mothers of newborns in two communities within the Fraser Health region that were identified by health officials as having suboptimal uptake of infant vaccination. One of the identified communities was affluent and had a high number of requests for alternative vaccination schedules by new parents. The other was less affluent and had a high level of newcomers (recent immigrants) who spoke languages other than English or French as their first language. The second community had recently experienced a pertussis outbreak due to low vaccination rates.

Participant recruitment and data collection

Participants were mothers of infants aged six months or younger, living in one of the two communities of interest. While the authors acknowledge that parents of all gender identities can birth and raise children, all participants in this study identified as cisgender women; therefore, the authors have chosen to use the language of 'mother' to accurately describe this study's specific sample. Recruitment involved referrals from the regional health registry of patients interested in participating in research and community outreach efforts through community organisations and programming aimed at new parents, such as library baby-times and 'mommy and me' drop-in programs.

Data were collected by one researcher (EG) who is a White female graduate student with a background in midwifery, had personal experiences as a mother and immigrant, and as someone who grew up in a vaccine hesitant community. Interviews were audio-recorded and took place within participants' homes. Researcher fieldnotes described each interview setting and the researcher's perceptions of the participant and interview process, generating preliminary analytic memos in conversation with one of the senior authors (DG). Initial analysis focused on reporting to inform public health infant immunisation programming and communications. Lead author on the current article (MM) performed systematic data analysis following initial reporting, and is a

racialised, trans-nonbinary graduate student with a professional background in doula/non-medical birth work and a research background in pregnancy/birth experiences within transgender communities and pregnancy decision-making about cannabis consumption.

Data analysis

This analysis used reflexive thematic analysis (Braun et al., 2022) to explore information needs and information behaviour themes that were noticed in the data but not pursued during the original study's analysis. Reflexive thematic analysis is a form of thematic analysis that asserts the subjectivity of data analysis in qualitative coding; it also asserts that the researcher takes an 'active role in coding and theme generation' (Braun et al., 2022, p. 8). Reflexive thematic analysis involved reflexive journalling (Janesick, 2015; Trainor & Bundon, 2021) and regular discussions among authors during initial data analysis and reflexive thematic analysis theme generation phases. Reflexive journalling can increase a researcher's own awareness of their positionality in relation to the research topic, allowing for deeper understanding of the data and findings (Meyer & Willis, 2019). Braun and Clarke (2023) assert that reflexive thematic analysis cannot exist within a vacuum void of the researchers' own biases, assumptions, and epistemologies. Relating to this study, the lead author's (MM) reflexive journalling contributed directly to their inductive coding of the interview data and shaped their theme generation. Reflexive thematic analysis-based theme generation was iterative and reliant on regular meetings and discussions between researchers where personal reflections and ongoing reactions to the data were integrated into the analysis and final theme descriptions and application.

Deductive and inductive coding occurred simultaneously. Some codes relating to information behaviours, needs, and sources had been created for use across vaccination studies and were broadly applied to the data during the initial analysis. For this analysis, many of the original codes were removed and refined while new codes were simultaneously introduced to the codebook and applied.

Results

Thirty-two semi-structured interviews were included in this analysis; 9 participants were referred to the study through the health authority and 23 were recruited through community outreach efforts. A summary of participant demographics is presented in Table 1.

Demographic Characteristics	Number of Participants (total n=32)
Age	
24-29 years old	7
30-34 years old	16
35-39 years old	9
Newborn Vaccination Decisions	
Fully vaccinated	27
Selective or delayed vaccination	3
Did not vaccinate	2
Self-Reported Ethnicity	
African	2
East Asian	3
European	21
Latin American	1
South Asian	5
Annual Household Income	
\$20k - \$40k	3
\$40k - \$90k	6

\$90k - \$140k	13
\$140k - \$200k	3
\$200k +	1
No data	6
Number of children	
1 child	20
2 children	9
3-4 children	3

Table 1. Demographic details of 32 semi-structured interview participants.

Four overarching themes were developed throughout the course of data analysis. Each developed theme illustrates common experiences described by study participants that were identified by researchers as key findings relating to the study's research questions. The four themes are listed below and explored individually in the following subsections:

1. Unmet information needs, though varied, persist among new mothers
2. Unmet vaccine-related information needs galvanise existing vaccine hesitancy
3. Vaccine hesitancy leads to more intensive information seeking and assessing behaviours
4. Trust and relationality are key aspects affecting vaccine hesitancy and confidence

Unmet information needs, though varied, persist among new mothers

In response to this study's first research question, researchers found that unmet needs persist among new mothers. While it is unsurprising that mothers experience dynamic information needs, this study found the information needs of vaccine hesitant mothers differed from the needs of those with vaccine confidence. Vaccine hesitant mothers consistently reported complex, vaccine-related information needs that remained unmet. In contrast, vaccine confident mothers did not report unmet information needs regarding vaccination, even though many had other unanswered infant health questions.

One participant did not feel a need to engage in additional vaccine-related research because she and her partner decided to vaccinate. Due to her lower infant vaccination information needs, she was surprised by how much information the public health nurse provided at the vaccination appointment:

To be honest, I didn't do a ton of research before [we vaccinated her] because we both did want to immunise her [...] I was actually surprised about all the information that we were provided with. (Cynthia, vaccine confident)

While she did not have any unmet vaccine-related information needs, Cynthia reported many instances where questions regarding her infant's health arose:

For instance, giving Tylenol; that might be something that I would Google and see if it was totally normal [...] I think you do kind of have to walk the line of taking advice or recommendations but also knowing what is best for your baby. (Cynthia, vaccine confident)

In contrast, Sarah, who chose to refuse all infant vaccinations, reported many vaccine-specific information needs that remained wholly or partially unmet:

Any of the real information: the ingredients that are in the vaccines, why they need to use the ingredients that they use...we can't find them [...] [For example] the ingredients in the vaccines given. Why aluminum? Why formaldehyde? What is its purpose? [...] Why do they need to be in there? (Sarah, vaccine hesitant)

Sarah's vaccine-specific information needs were numerous and largely unmet by local public health resources. Another mother voiced similar concerns, including specific questions regarding why public health resources excluded certain types of information, 'I mean you walk into a tobacco store and it says, 'Caution cigarettes have formaldehyde.' Why doesn't it say the same thing on vaccinations?' (Hebah, vaccine hesitant). These concerns illustrate how these mothers pay close attention to public health resources; if resources do not adequately meet one's information needs, confidence in the public health system and healthcare providers may falter.

Vaccine confident mothers did not report having unmet information needs regarding infant vaccination even though every participant named instances in which other health-related information needs arose. However, vaccine hesitant mothers reported many vaccine-specific information needs that remained unmet by public health resources and other encountered information sources. For some, these complex information needs extended from questions directly relating to vaccines and vaccination to additional questions about public health authority policies, communications, and the trustworthiness of specific sources of information.

Unmet vaccination-related information needs galvanise existing vaccine hesitancy

While data analysis quickly revealed the differing information needs of new mothers, further analysis revealed that some vaccine hesitancies were affirmed or galvanised by information needs being left unmet. Galvanisation may be particularly acute when significant time and effort are invested into information seeking behaviours with no satisfactory results.

Sarah, who refused infant vaccination, had many unanswered questions that strengthened her and her partner's hesitancy. While she stated she would be more inclined to follow the suggested vaccine schedule if their specific questions were adequately answered, she also mentioned being unable to answer her questions affirmed her lack of trust in the public health system:

If you can tell me why you have to [use specific ingredients] and it makes sense, okay, I will take the risk and vaccinate my kid, but you're being so secretive about it[...] What is it that you're [the public health system] hiding from us?[...] It shouldn't be this hard to find information on both the pros and cons of vaccines[...] That's where the transparency would be lovely. (Sarah, vaccine hesitant)

Being unable to answer her questions, even after extensive searching, Sarah noted that the lack of transparency from both the pharmaceutical and public health sides left her and her partner feeling distrustful of the entire healthcare system:

If I knew the research behind it and I knew the ingredients and they [public health authority and pharmaceutical companies] were open and upfront and non-dismissive, I would perhaps be [...] less resistant to having it done, regardless of age. (Sarah, vaccine hesitant)

For Mei, vaccination decisions were complicated by information needs not being adequately met. Her ultimate decision to delay some vaccines and exclude others stemmed from vaccine-specific questions not being satisfactorily addressed by public health resources:

[The public health fliers] didn't really tell you what [...] it was treating [...] I did try to look online a bit [in] official research from journals and what not but it's so hard to know what's right and wrong and there's always a bias one way or the other and there's no really middle ground that just gives you the fact. So, it was a hard decision. (Mei, vaccine hesitant)

Sources of information participants found inadequate included public health pamphlets, academic journal articles, and conversations with healthcare providers. Healthcare providers were

significant sources of information. However, their responses to questions about vaccination had the potential to galvanise vaccine hesitancy when they failed to address a mother's concerns. For Hebah, the advice of a prenatal educator left her feeling unsatisfied and unwilling to vaccinate her infant:

The discussion in my prenatal class about vaccination wasn't really a discussion. It was just a statement [...] 'Get them' [...] And that wasn't enough for me [...] I wasn't just going to go and do what I was told based on that. (Hebah, vaccine hesitant)

Unmet vaccine-specific information needs thus galvanised existing vaccine hesitancies, and the inadequacy of information participants sought or encountered about vaccination had the potential to affirm distrust not only of vaccination but extending to public health more broadly.

Vaccine hesitancy leads to more intensive information seeking and assessing behaviours

Addressing the study's second research question, this study found that while all study participants described various forms and amounts of information seeking and assessing behaviours, vaccine hesitant mothers described significantly more time- and labour-intensive information seeking and assessing practices than those with vaccine confidence. Many vaccine confident participants did not feel a need to participate in information seeking in addition to information encountering; this was, in part, due to an established trust in the public health system and the advice and recommendations received.

Instead of active information seeking regarding infant vaccination, many vaccine confident mothers described information encountering through public health resources that were automatically provided. This encountered information included public health pamphlets, published booklets, and verbal advice:

I got something in the mail that said vaccines are coming up and these are the ones that you need to get and when. I found that very helpful [...] It was from [the government-run public health services]. It was in the mail [...] and I received it right before] when her first set of shots was going to happen. (Taylor, vaccine confident)

[The public health nurse] gave me a lot of paperwork to read and she gave me also the passport for the vaccinations. (Jessica, vaccine confident)

I do however like that the public health unit gives you that Best Beginnings book [...] We were given all the pamphlets and stuff like that; we read all of those. (Catalina, vaccine confident)

In addition to different seeking or monitoring practices, participants described differing information assessment practices, some of which were more involved and intensive than others. For some vaccine confident mothers, having robust trust in their healthcare providers made assessment simple and quick. One such participant described not feeling the need to read provided vaccine resources because she already trusted the public health recommendations for infant vaccination:

I just trust that what's being recommended is backed up by the best research available [...] [The public health nurses] passed out a few like info sheets to do with common questions to do with vaccines and all this stuff. Honestly, I didn't even really read them I was like, okay, well I've kind of made my mind up that I'd rather [...] get them [...] It's always worked out fine for me so far to just kind of go with what the doctor recommends and that's what I've stuck with. (Manpreet, vaccine confident)

Manpreet did not feel the need to triangulate or individually assess information coming from a source she deemed trustworthy. Meanwhile, Maki described a greater degree of information

assessment despite foundational trust in and typical acceptance of the recommendations of healthcare providers:

I'll take everything with a grain of salt. I'll take their information and kind of do my own thing. If I feel it's best for him, then yeah, I would go with that for sure. I usually feel like I do side with the doctors like I take their opinion pretty seriously. So if they recommend something, then I'll definitely take that into consideration [...] I trust their opinion. (Maki, vaccine confident)

While vaccine confident mothers in this study had information needs that ranged from newborn feeding to vaccinations and beyond, those were often easily satisfied either through a conversation with a health provider or through previously provided written resources, such as mailed pamphlets.

In contrast, vaccine hesitant mothers described frustration with the lack of answers they received, both during attempted conversations with healthcare providers and when reading public health resources. Hebah noted no detailed information about specific risks and side effects were available on the public health website; this dearth of detailed information contributed to her infant vaccination refusal and led to additional active information seeking in collaboration with her partner:

The public health website has six reasons that you should vaccinate your child. And one of them says reason number five is because serious side effects—because serious [...] reactions or serious side effects [...] are rare. So, it says blatantly serious side effects are rare. But nowhere on the website does it tell you what they are... Completely unhelpful [...] And [my husband and I] weren't on the same page when it came to vaccinations so I asked him to find me some studies that show [...] the positive outcomes of vaccinations and he searched for weeks and [...] he couldn't find anything [...] I couldn't find any credible information on why vaccinations were safe. (Hebah, vaccine hesitant)

While some vaccine hesitant participants sought scientific literature, others described going 'beyond' research while information seeking. Rebecca stated that she knew a certain study had been debunked, but hearing anecdotal stories from many parents triggered her search for more information:

Medical professionals often say, 'Well that study has been debunked', and fair enough [but] I'm not going based on the study. I'm going based on the thousands of parents whose children have been negatively affected. I'm going on the fact that there was a lawsuit [and] the companies settled [...] Those were some of the things that [...] informed my decision. (Rebecca, vaccine hesitant)

Rebecca engaged in extensive information seeking and assessment in direct response to her underlying hesitancy being galvanised by anecdotal information she encountered. Her information assessments prioritised first-hand experiences as key pieces of information and she actively triangulated not just anecdotal and scientific evidence, but also legal and cultural contexts that informed her decision.

Vaccine hesitant mothers described information seeking and assessment behaviours that were more time- and labour-intensive than those with vaccine confidence. While some hesitant mothers increased their information seeking and assessing specifically in response to unmet information needs, others expanded their search for answers out of distrust in the public health system due to perceived lack in transparency.

Trust and relationality are key aspects affecting vaccine hesitancy and confidence

All mothers in this study described intentional decision-making, caring deeply for the health and wellbeing of their infants. Most participants raised the importance of developing trusting relationships with their healthcare providers. For one participant, having a public health nurse come to her house to offer postpartum support contributed to a trusting relationship with the public health system:

Yeah, and then the nurse came to the house [...] within that first week and that helped a lot [...] 'Cause she checked on how I was breastfeeding and they weighed her- cause she was such a low weight, so I guess the local health care came and checked on her and [...] I thought that was great. (Taylor, vaccine confident)

Many vaccine confident mothers reported having trusting relationships and good rapport with their healthcare providers:

The Health Canada website I find I probably trust the most [...] 'cause I'm a librarian [...] And of course my family doctor, if we have something that we really want a good answer for, we would wait [...] and ask the doctor. (Charlotte, vaccine confident)

I trust them [...] We get a lot of our information from our doctor and the [public] health nurses were fabulous at giving out the most recent up-to-date information. (Liliana, vaccine confident)

The doctor. I have been working with him for ten years so I totally trust him. (Harpreet, vaccine confident)

Some hesitant participants also described trusting their doctors because of good encounters with them while receiving care. For one such mother, having a doctor provide good care for postpartum depression really improved her provider-patient relationship:

She's made me feel [...] like I can come to her, you know. She's like trying to make sure that I don't have any postpartum depression issues or anything like that [...] That incident has actually made me fe[el like] we've [got] a better relationship with my doctor. (Rebecca, vaccine hesitant)

For this participant, who chose to exclude one specific vaccine from her infant's vaccination schedule due to family medical history, being able to build rapport with her primary healthcare provider was crucial in her personal health decision-making to accept most vaccinations.

Many of this study's vaccine confident mothers used the word 'trust' to describe their relationships with healthcare providers. In contrast, some vaccine hesitant participants were openly distrustful of public health resources and providers, academic journal articles and other sources of information as well as the pharmaceutical industry. When asked what made her question medical advice regarding vaccination, one mother described how her negative birth experience resulted in broken trust in the healthcare system saying, 'If I had just done what I was told, I would've [...] put her at greater risk. So [...] I lost a little bit of faith in the medical system' (Hebah, vaccine hesitant).

Discussion

This study found that vaccine hesitant mothers have distinct information needs compared to vaccine confident mothers. While standard public health resources were available to all study participants, the perceived adequacy of these resources varied depending on a mother's vaccine confidence. For this study's vaccine confident mothers, the universally provided public health resources were adequate and satisfied their vaccine-related information needs, relieving them of the need to seek additional information. Vaccine hesitant participants were provided with the same

public health resources. However, they consistently reported this information to inadequately meet their information needs by lacking detail or transparency or by not addressing their specific questions. These findings build on McKenzie's model of information practices in everyday life information seeking (McKenzie, 2003) by revealing how vaccine hesitancy or confidence may result in different 'modes' of information practices. The vaccine hesitant mothers in this study often described 'active seeking' or 'active scanning' (as named by McKenzie) while the study's vaccine confident participants were more likely to describe 'non-directed monitoring'. The study's findings also affirm and extend previous findings that vaccine confident parents are more likely to trust a single source of information, whereas vaccine hesitant parents report more intensive information seeking from multiple sources (Mierzecka et al., 2023).

Previous literature has also established convenience is a key part of information seeking behaviours in many contexts (Connaway et al., 2011). In contrast to this scholarship, this study found that, for vaccine hesitant mothers, a desire for convenience may be overpowered by a more pressing need to adequately address unmet vaccine-related information needs. For these mothers, conveniently encountered information resources that were provided by the public health system were not found to sufficiently address their questions; they engaged in more robust, and sometimes inconvenient and labour-intensive, information seeking behaviours.

This study's vaccine hesitant participants frequently voiced mistrust in the public health system providing vaccine-related resources, often leading them to engage in additional information seeking. Previous literature suggests that increased online information seeking regarding vaccination may lead individuals to increased health anxiety and vaccine hesitancy (Argyris et al., 2021; Lee & Kim, 2015; Rathbone & Prescott, 2019; Tustin et al., 2018). In particular, researchers found increased online information seeking focused on vaccination resulted in higher odds of individuals perceiving vaccinations as 'unsafe' (Tustin et al., 2018). Tustin and colleagues' statistical findings are affirmed by this study's results, which found increased information seeking in response to continually unmet information needs, and galvanised pre-existing vaccine hesitancies in some mothers. As previously mentioned, researchers have also found that increased positive healthcare experiences can significantly alter a mother's vaccine-related fear and anxiety (Greyson & Bettinger, 2022). This study's findings affirm that improved clinician support of complex health information needs may address vaccine hesitancy in some mothers. Further scholarship is necessary to explore the relationship between mistrust, either with individual healthcare providers or the public health system, and information seeking, especially within the context of vaccine hesitancy.

Implications and recommendations

Information science within public health

While vaccine hesitancy is often considered solely a public health concern, this study demonstrates how vaccine hesitancy is a complex issue ideally addressed through interdisciplinary scholarship. Vaccine hesitancy in parents of newborns, while complex and multifaceted, has an informational aspect that could be better addressed through collaborative efforts between information scientists and public health. Considering this, there are several opportunities for collaboration with those in public health to better address the information needs of vaccine hesitant parents.

Firstly, information scientists can play a key role in increasing the knowledge and awareness of primary healthcare providers regarding the sheer complexity of the information needs and behaviours of vaccine hesitant parents. This study found that vaccine hesitant parents often have specific information needs that remain unmet by standard public health resources. Primary healthcare providers must develop a better understanding of how addressing the specific information needs of new parents may reduce or eliminate vaccine hesitancy. Directly addressing the vaccine-related information needs of parents will require major efforts in trust- and rapport-

building. As healthcare providers develop increased awareness of parents' information needs regarding vaccination, they will be better equipped to conduct empowering conversations with their patients within clinical contexts. Public health must understand trust is earned, and taking the information needs of vaccine hesitant parents seriously is a significant opportunity for clinicians and public health providers to build trusting relationships.

Secondly, opportunities are ripe for the interdisciplinary creation of resources that address more complex information needs. While having simplified and straightforward resources regarding vaccination mitigates information overwhelm for many new parents, this study has shown this approach is not appropriate or adequate for many vaccine hesitant parents. Therefore, additional knowledge translation is needed with the stated goal of providing more information to address complex information needs regarding childhood vaccination. Creating additional resources with more complex information may also work to increase trust between vaccine hesitant parents and public health through increased information transparency.

Information science beyond public health

This study revealed that, in addition to having consistently unmet information needs, vaccine hesitant parents often described lack of trust or hesitancy to trust the public health information. Trust and relationality are vital parts of decision-making and engagement with information and information sources; this is especially true for issues that are highly personal and considered 'high stakes' such as the health and medical decisions for one's infant. This study found that, regardless of vaccine opinion, developing trust within clinical relationships is paramount to patients feeling satisfied and supported in their health decisions. Because of a lack of trust in the public health system that was revealed in this study, information scientists must look beyond public health to better support the information needs of vaccine hesitant parents. Grassroots and community-based opportunities for knowledge translation initiatives relating to childhood vaccination, specifically targeting vaccine hesitant parents, should be explored. Individuals must be able to access evidence-based information outside of clinical spaces and relationships. Health information being siloed into clinical spaces can be a significant barrier for those who experience lower trust in their public health and/or medical systems.

Strengths and limitations

This study offers a thorough exploration of the information needs and information seeking and assessing behaviours of mothers of newborns regarding vaccination. In-depth semi-structured interviews and reflexive thematic analysis provide study rigour through reflexive practices that attend to researcher bias. This study did not aim to produce generalisable results. Study findings require further exploration and validation in additional contexts and target communities.

Conclusion

This study found that vaccine hesitant mothers have different information needs and subsequent information seeking and assessment behaviours compared to vaccine confident mothers in the same communities. Vaccine hesitant mothers reported consistently unmet vaccine-related information needs and described more intensive information seeking and triangulation practices because of these unmet needs. Information scientists have ample opportunity to better support vaccine hesitant new mothers by exploring interdisciplinary approaches to vaccine information resource creation and distribution as well as increased clinician education on complex information needs and behaviours that are likely to affect clinical engagement and experiences. Additionally, the relationship between mistrust and information seeking that should be further explored, ideally in collaboration with public health. Findings from this study indicate that increased and creative vaccine communication opportunities should be explored to address vaccine hesitancy in target communities.

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