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Understanding the Messages and Motivation of Vaccine Hesitant or Refusing Social Media Influencers

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Abstract

Background: While anti-vaccine messages on social media have been studied for content, reach, and effectiveness, less is known about those who create and promote the messages. Online influencers, or 'everyday people who are influential within their online social networks', are viewed as trusted voices who are often making similar life decisions as their followers. Therefore, their experiences with and perspectives on health issues can be persuasive.

Methods: We collaborated with a formal network of online influencers to interview, using a semi-structured interview guide, vaccine hesitant influencer mothers about their views on vaccination; their process for developing health-related social media content; their motivation to promote anti-vaccine messages; and their opinions on current vaccination messaging. Prescreening ensured a diverse sample by race/ethnicity, age, education, number of children, and geographic residence. Interviews occurred by telephone, were audio recorded, and transcribed. Themes were generated independently by two coders using a deductive coding approach.

Results: We interviewed 15 online influencer mothers from across the U.S. (average age 39 years old; all married; 13 Caucasian, 1 African American, 1 Hispanic). In some capacity, 5 of the 15 wrote about vaccination on their blog. Those who chose not to post anti-vaccine content did so for fear of alienating followers or having their platform be the site of combative discourse among readers. When researching their social media posts, the influencers did not trust mainstream sources of health information and relied on alternative sources and search engines.

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Implications: This exploratory study interviewed influential mothers who have the ability to spread anti-vaccine messages on social media. While most do not contribute to the anti-vaccine sentiment, understanding the motivation and practices of those that do assists the public health community in better understanding the online vaccination communication environment, leading to more effective messages to counterbalance anti-vaccine content on social media.

Keywords

social media; online influencers; vaccination; hesitancy; vaccine hesitancy; health communication; information dissemination

Introduction

Vaccines are among the most cost-effective clinical preventive services and are a core component of any preventive services package. Immunization programs provide a very high return on investment. For example, for each birth cohort vaccinated with the routine immunization schedule, 33,000 lives are saved, 14 million cases of disease are prevented, and direct health care costs are reduced by $9.9 billion. [1] Yet, despite progress, approximately 42,000 adults and 300 children in the United States die each year from vaccine-preventable diseases. The World Health Organization has identified the issue of vaccine resistance and hesitancy as a top threat to global health. [2]

Social media & the advent of influencers.

Growth in the use of digital health communication channels has dramatically changed the nature of communication. There are currently 3.8 billion social media users globally,[3] and 70% of Americans use social media to connect with one another, engage with news content and share information.[4] As more Americans have adopted social media, the user base has grown more representative of the broader population. Today, there is near-equal participation on social media by age, race, gender, education and income levels, [4] which ensures a wide range and diversity of experiences, opinions, and discourse on social media.

An aspect of social media that has emerged in recent years are “online influencers,” which are “everyday people who are incredibly influential within their online social networks”. [5] While millions of people post content to social media, online influencers have established online profiles, talk about a topic or set of topics they are familiar with, and have a cohort of followers who trust their thoughts, opinions, and perspectives.” They often garner large followings on social media, which increases the likelihood of engagement with their posts, which, in turn, amplifies the visibility of their content.[5] For years, online influencers have been recruited to disseminate information and encourage consumer behaviors.[5–8] Influencer endorsements contribute to increased purchasing behaviors as well as brand trust, even more so than celebrity endorsement, given that influencers are perceived to be more relatable and credible. [9] Only recently have health communication and behavioral scientists begun to shift their attention to partnering with online influencers. [10–13]

Implications of social media messengers and messages on vaccination.

Social media democratizes the ability for many voices - lay consumers, health professionals, the pharmaceutical industry - to share their knowledge about and experiences with vaccination, in both positively- and negatively-toned messages. To date, a variety of studies have shown that anti-vaccine messages receive more attention across social media platforms than pro-vaccine messages.[14–17] More recently, semantic network analysis allows for the graphical representation of these discussions, showing that pro-vaccine posts and anti-vaccine posts feature different key words and cluster together, albeit independently.[18] Lastly, research shows that social media may impact vaccine knowledge, awareness, and attitudes among people who read this information and may be influential in vaccine uptake.[19] As the field of social media research continues to grow, greater insight into the impact of these messages and messengers on behavior will be better understood.

Given the reach and impact of social media messengers and messages on lay audiences, health communicators should aim to better understand how these messengers may be shifting the online conversations about vaccination – and what messages can be shared proactively to address such misinformation. It is within this context this study was designed. The researchers collaborated with a formal network of online influencers, mostly mothers who live in the U.S., to interview, using a semi-structured interview guide, 15 influencers who do not vaccinate their children. Results from this study can inform future health communication approaches to message development and messenger identification that may resonate with vaccine hesitant parents and reinforce the beliefs of parents' who already support vaccination.

METHODS

Online Influencer Network.

Participants were recruited via a network of approximately 3,000 online influencers called The Motherhood. Influencers apply to join networks like The Motherhood to be connected to others like them and have access to opportunities for creating paid content with recognizable brands and organizations. Members are invited into the network based on criteria set by each influencer network. Many online influencers derive significant income from their posts and content, which are disseminated on various social media platforms depending on the preference of the influencer or the campaign sponsor.

The Motherhood's network consists of influencers who almost exclusively reside in the U.S. but are geographically spread across the country (residence: 21% in the Southeast; 7% in Southwest; 13% in the West; 28 % in the Northeast/East; 22% in the Midwest; and 9% in the Plains). The network is 97% female and roughly 80% of bloggers identify as Caucasian, 8% Hispanic/Latino, 6% Asian, 2.5% African American, and 3.5% "Other".

Screening and identifying participants.

To identify influencers who were vaccine hesitant or refusing, we asked the following questions to all of the influencers: (1) "if your doctor recommends a vaccine for your child, how likely are you to get it?" and (2) "do you write about your position on vaccinations on

your blog or social media?" Our screening question was informed by the literature suggesting that physician recommendation is the strongest predictor of vaccination, [20] guided by our desire to keep the screening brief, and acknowledging that no universal measure of vaccine hesitancy exists. [21] We used the results from the 32 influencers who responded to prioritize online influencers for interviews. In creating the list for interviews, we prioritized vaccine hesitancy first, then tried to ensure diversity in race/ethnicity, geographic residence, number of children, and age.

Conducting interviews.

The Motherhood contacted influencers on the list and brokered the interview date and time, providing a conference line for both parties to use anonymously. Verbal consent was obtained from all participants prior to the start of an interview. Interviews were conducted over the telephone by one of two interviewers, were audio recorded, and transcribed verbatim. Each interviewee was compensated an amount between $50 to $150 based on her social media reach, which is standard industry practice for compensating influencers. Interviews ranged from 32 to 64 minutes, with the average interview lasting 46 minutes. We received expedited approval from the home institution's Institutional Review Board.

Interview guide.

The interview guide consisted of more topics than are described in this paper. For the purposes of this analysis, we discussed the influencers' views on vaccination; how an influencer researches and writes a post, particularly about a health topic; whether an influencer writes about vaccination; and reactions to current public health messaging about vaccination. The full interview guide is contained in Appendix A.

Demographic data.

At the end of the interview, a brief survey collected the age, race/ethnicity, marital status, and educational attainment of the influencer, her geographic residence (state and whether her community is urban, rural, or suburban) the age and gender of each child, when she started blogging, and her frequency of posting.

Data analysis.

Quantitative data from the surveys were analyzed using descriptive statistics. Each interview was coded independently by two coders using a deductive coding approach, where we identified themes based on the level of pattern among interviews and the meaning in relation to the research questions. [22] Themes were largely developed apriori based on the interview guide and the researchers' expertise, but some sub-themes arose organically throughout the coding process. A list of themes and sub-themes can be found in Table 1. Discrepancies in coding were resolved by consensus. Debriefing after each interview, the interviewers felt that they had reached saturation, meaning no new information or perspectives were being offered, after 15 interviews.

RESULTS

Sample characteristics.

We interviewed 15 influencers, all of whom were female and married. The majority were Caucasian (n=13); one was African American, and one was Hispanic/Latino. They ranged in age from 27 to 53 years old, the average influencer was 39 years old. Five influencers had a high school diploma or an associate degree, 7 had a college degree, and 3 had an advanced degree. Influencers had between 1 and 9 children who ranged in ages from 3 weeks through 22 years. Six of the 15 influencers did not vaccinate their children while 9 selectively vaccinated and avoided some vaccines. The 15 influencers lived in 13 different states; 7 lived in rural communities, 7 lived in suburban communities and one lived in an urban community. Fourteen of the 15 influencers reported maintaining a blog; most (n=9) had been blogging for at least 5 years. Most (n=9) reported that they aimed to share new content with their readers multiple times a week. Descriptive characteristics of the sample can be found in Table 2.

Views on vaccination.

The influencers that we spoke with were raised in families where vaccination was the norm. They were vaccinated as children because it was standard practice in previous generations. Influencers said that they inherited the same vaccine views as their parents and, as new parents, had their newborns and infants vaccinated without question. As one influencer noted,

> “There was never any framing of vaccinations in a negative light growing up. It was just something you did.”

As the influencers grew into their roles as parents and decision makers, their views about vaccination shifted. For some, this change in perspective came from reading and researching topics such as vaccine ingredients, as well as their evolving philosophical and religious objections. For others, this shift came about from hearing stories from friends and family about children who were allegedly harmed by vaccination. As one influencer said,

> “The ones [arguments] that have made me pause have to do with stories people tell about people in their family that have been injured and they think it’s from the vaccination.”

Many of the influencers voiced concern about the number of vaccines that are being given to children. They were keenly aware that the number of childhood vaccines on the recommended schedule has increased substantially in the past 20 years, and there was concern that the increase was not warranted in a manner that justified the risk to their child. As one online influencer said,

> “When I was a kid, I think I got a total of 5 vaccines. Now, today, kids by the time they’re 18, they get like 63. Our kids are not healthier. Our kids are sicker than they’ve ever been before. Autoimmune diseases skyrocketed. Autism skyrocketed. ADHD has skyrocketed.

They also questioned the intentions of the pharmaceutical industry and government agencies that promote vaccination. They explained that there is money in vaccination, both in the production of vaccines and in requiring them for school entry. As one influencer stated,

> "There are a lot of conflicts of interest. There's quite a bit of revolving door between the government agencies that are supposed to regulate [vaccines] and the companies that are producing them."

Among the influencers we spoke with, having their child vaccinated was ultimately a balance in risks. Despite their concerns about vaccination, some acknowledged that there was risk in not vaccinating, that some of the infectious diseases that were reported on in the media were serious, and that vaccines did serve a role in society. As one noted,

> "Vaccines have some effectiveness against some things. The question is whether they have enough effectiveness against the right things to be worth the possible negative impact they may have on the individual."

Another influencer shared,

> "I don't think in a developed country, measles is as big of a deal as they make it out to be, and I think it [measles] has some protective benefits.

The influencers voiced concern that vaccines are mass produced and are not able to be tailored for an individual's biological response or risk, which is contrary to other aspects of health care that are highly personalized. One influencer explained,

> "No, vaccines are not one-size-fits-all and that each of us is made up of different genetics. So what works for one person may be fatal to another."

Notably, influencers overwhelmingly put protecting their child over protecting society's children. As one participant said,

> "I'm "pro" my children. I don't know how I would rank that as pro-vaccination or not; I'm "pro" my children and what's best for them.

Researching for a post.

When asked whether they would research a topic prior to writing about it, influencers reported that they will conduct research when writing about something less familiar or when purposefully aiming to educate their audience about a topic. All of the influencers we spoke with noted the widespread availability of health information on the Internet. The expertise of a physician holds credence for some; for others, physician recommendations are less important. They recognized that medical journals that can be accessed online are credible sources, but also mentioned websites such as Dr. Sears, Dr. Cloud, Stanley Plotkind's testimony on YouTube, and Joey & Rory Slick. God was also mentioned as a trusted source. Many conveyed that the average person on social media who is posting in Facebook groups and sharing his or her opinion is more credible than a celebrity. They did not trust information from celebrities, the media, and pharmaceutical companies. As one influencer noted,

> "I will go and look at the internet and see if there's – are there controversies about these ingredients or is there something wrong?... I'll just Google it and see what

> people are talking about… for things I think might be problematic, I'll take an hour or so and just Google and look if there's any news sources or medical sources that have something to say about it."

When asked about using government sources of health information, there was general agreement that the data the government agencies collected was accurate, but the interpretation of the data could not be trusted. For example, they will use the data from the Centers for Disease Control and Prevention's (CDC) Vaccine Injury Datafile but will not rely on the CDC's interpretation of the data. Many also felt that Google and Pinterest were censoring their words and/or the information available to them. As one influencer stated,

> "I go [to Facebook] because I know I can't go to Google and search something, because it's censored, and I'm not going to find true information."

Therefore, these influencers shared that they used alternative methods for obtaining information For instance, they noted that they often use the search engine, "Duck, Duck, Go," in lieu of Google because it provides uncensored information. As one influencer shared,

> "There are other search engines, like, I think it's called DuckDuckGo that aren't as censored from — I would try other search engines, I mean, keep looking for things. If she's [a mother] researching on her own."

Influencers reported that it is possible to obtain health information through the use of emerging technologies, such as genetic testing platforms like *23&me*. More than one influencer explained how she used an online genetic testing company to obtain genetic information about her children, then input this data into third party applications that tested for mutations believed to confer susceptibility to vaccine injury.

Writing about Vaccination.

When the influencers were asked whether they write about vaccines on their social media platforms, there was a mixed response. Only one influencer actively posted anti-vaccine content on her platform. Four other influencers had posted content at one point, but infrequently and not recently. The remaining ten influencers never posted anti-vaccine content on their platforms.

The influencer who was an active poster of content was motivated to tell the 'true story' of vaccines as well as offer advice to parents about where to find truthful information. She shared,

> "I try to give them reliable sources where they can find data. I might try to show how things don't add up in certain areas. I don't really tell people to go to the doctor because it's, in my, in my experience many of them seem to be misinformed or underinformed or they don't know, they don't really have a clear idea of what's in a vaccine or what a vaccine injury is. I usually actually tell them to look for other sources besides your doctor because they're not as, you know, unless they've studied immunology or virology or vaccine science, they really don't know as much as you think about the actual vaccines"

The other influencers who wrote about vaccination took a more conservative approach to their writing. One influencer said that she preferred to write about her personal experience rather than her position on vaccination. She noted,

> "So, for me, I talk about it when it comes up, like if I have a pediatrician appointment and the doctor brings it up or whatever, I'll talk about that experience. But I don't go out of my way to really blast people with information about my situation or what they should be doing."

Another influencer was careful not to be seen as an 'anti-vaxxer', which has a negative connotation in the current environment. She said,

> "I try not to overload people and I try not to make my – I don't want to make a name for myself as an anti-vaxxer because there's a lot of stigmas that surround that term."

When asked about the comments one influencer received to a post with anti-vaccine content, she alluded to the divisiveness of the social media environment, saying,

> "Like, people either like love it [the post] and love you for it, or they hate it. There's, like, not a lot of in-between."

Another influencer noted that the current online environment makes her not want to post antivaccine content. She explained,

> "It takes some fortitude to write about anything that's a particularly polarizing topic because you know you're going to be dealing with the haters. "

One influencer specifically mentioned not wanting to alienate her readership, saying,

> "I have not [posted] because it's such a controversial topic and I don't know how to approach that and not lose followers."

Another reason that influencers chose not to write about vaccination is that they did not feel that they were qualified to speak on the topic. Or, they felt that they didn't have anything novel to contribute to the conversation. One explained,

> "I don't feel like I'm qualified to give opinions or information on vaccinations, honestly. I don't have the expertise to be giving that kind of information to my readers. And I don't really have super interesting opinions to share on it, I guess."

Communication & messaging.

As people who create messages for a public audience, the influencers were asked to comment on current and previous vaccination messages in mainstream media. We also asked them about their opinions of the media outlets that disseminate these messages. First, this audience specifically wants messaging that stops making them feel guilty for not vaccinating. As one influencer stated,

> "There's a commercial they have on where they have – they're trying to guilt trip the mom. And they're like, "Mom, did you know there was a vaccine?" That's gonna make them [mothers] angry with you because we have enough guilt and enough worry as moms to be sitting around watching commercials telling us you

> better go get it because someday your kid's gonna say hey, I have cervical cancer and it's your fault."

All of the influencers felt that mainstream media overstates the risk of communicable diseases to promote vaccination, as well as instills a sense of fear of the disease. One influencer stated,

> "I think the media is completely — they're fear-mongering. They're paid off by the pharmaceutical companies as much as the doctors are. So, I think the media reports — they just want a story to report and they blow it up and they inflate it and I think the media does more harm than good."

DISCUSSION

This study is one of the few that have engaged social media influencers with vaccine hesitant or anti-vaccine views in direct discussions about their experiences as influencers. We found that the influencers have strong views about vaccines that are reinforced by their own research, personal experiences, and the experiences of others. When writing their posts, they often turn to non-traditional sources for health information. They feel that the media greatly overstates the risk of infectious diseases. However, among those who we interviewed, only one actively wrote about vaccines on social media. An additional four had previously or infrequently wrote about vaccines, and the remaining 10 had never posted about vaccines. Below, we build on these findings by situating them in them literature and discussing future implications for the field of vaccination communication. A summary of our findings and corresponding recommendations is in Table 2.

Ten of the 15 influencers who we spoke with did not use their social media platform to share their antivaccine viewpoints. While this may seem like a 'win' for the public health community – those with anti-vaccine views and a platform to reach millions are not comfortable using it – it begs the question of why this is the case. The influencers we spoke with were careful of their image on social media, particularly those who drew income from their blogging activities. As the social media landscape is increasingly populated with pro-vaccine content, [23] posting opposing views about vaccination risks alienating those who support their work and future income from brands and organizations.

It may be that influencers are not the primary driver of anti-vaccine content on social media; rather, individuals with less to lose than professional influencers may be fueling the movement online. [24] Indeed, research in uncovering the face of the anti-vaccine movement suggests this to be true. [25] However, the public health and medical community should not be complacent by our findings. The influencers we spoke with have the knowledge, abilities, and skills to use their platform at any time to reach large audiences with anti-vaccine messages that would appear credible to a parent who is undecided about vaccination. Moreover, influencers are emerging as agents in behavior change, [26] indicating that partnering with influencers may be beneficial to public health.

Based on insights from the influencers, we present the following implications for public health practice:

New messengers are needed.—The influencers that we interviewed indicated that they relied more on non-traditional sources for health information, such as websites and other mothers, than traditional sources such as physicians and public health professionals. Previous research supports our finding, suggesting that those who are hesitant of vaccines are less likely to trust government sources and health care providers and also see them as less credible. [27–29] The public health community would be wise in partnering with influencers who will disseminate accurate and credible pro-vaccine messages. While we acknowledge that it may be challenging to engage influencers in discussions about vaccines, those who are most passionate about the topic, such as a parent who lost a child to a vaccine-preventable illness, may be the easiest to engage.

New messages are needed.—Our research suggests that previous messages about vaccinating a child to protect the community, drawing on principles of herd immunity, may not be as effective with today's parents. Others have found similar results when talking with parents, [30] and influencers recognize that these messages do not resonate as strongly with today's parents. Additionally, messages that aim to induce feelings of regret and guilt for not vaccinating were extremely unpopular with the influencers we interviewed; they felt that these messages were unfairly trying to capitalize on feelings of anticipatory regret [31] or "mommy guilt" [32] that mothers often face each day. Influencers that wish to share pro-vaccine messages may be most successful with messages that combine "head" (i.e. science) with "heart" (i.e. feelings). [33] Similarly, incorporating vaccine content into messages about 'regular' life rather than isolating it as discussions had annually with a pediatrician may reduce the anxiety and heaviness of them.

New vaccines are sought – and messaging should consider how to address this need.—Interestingly, in our sample of influencers, not all of them were completely against vaccines. Some acknowledged that vaccines have successfully eradicated global health diseases and are appropriate for some people in some contexts, such as those without underlying immunological conditions or those living in regions with endemic disease. Many said that vaccine science has not kept up with personalized medicine or the "green" movement. They called on the pharmaceutical industry to manufacture vaccines that are tailored to a person's genetic profile or vaccines that are made from more natural ingredients. While tailored vaccines or personalized vaccine schedules may not be currently possible or probable, a related discussion and communication strategy about why vaccines cannot be tailored or customized is warranted. Ultimately, this taps into a larger discussion about how to better engage with consumers about vaccine science and address some of their concerns.

The risk of the disease vs. the risk of the vaccine.—Whether a conscious or unconscious decision, vaccinating one's child requires weighing the risks of the disease that the vaccine is designed to prevent versus the risks of the vaccine. For the influencers that we spoke with, the risks of the vaccine far outweigh the risks of the disease. They often cite stories of children who have had adverse reactions to vaccines, whether they personally

knew the child or not, as their reason for believing the risk of the vaccine is so great. Previous research confirms that people are strongly swayed by personal narrative, and that those stories can alter perceptions of risk. [34] They also feel that despite the rise and return of previously eliminated infectious diseases in the U.S., [35] their personal risk is quite low. This is not uncommon, as this lack of perceived susceptibility to infectious diseases is highly influenced by personal biases that are confirmed in news stories and public debates.[36] Influencers who are willing to write positive stories of vaccination experiences may be able to shift vaccine perceptions among vaccine hesitant parents.

Social media and new technology helps fuel the anti-vaccine movement.— Social media is widely used to promote and disseminate health-related content, from patients accessing information about a disease [37] to officials using it for real-time surveillance. [38] While these are generally positive uses, social media is also home to large quantities of anti-vaccine misinformation. Our study found that these influencers gravitate towards search engines and platforms that return information and results that align with their views, a form of confirmation bias. Previous research documents this phenomenon, finding that including certain terms or keywords in search strategies return vastly different results. [39,40] Similarly, technologies are available, such as apps that allow parents to self-analyze their child's genetic data from online ancestry site to uncover genetic susceptibilities to vaccines, to obtain medical exemptions from school-mandated vaccines. Influencers may be more likely to share information about technology that enables parents to resist vaccines than to directly state their views on vaccines, as technology is not as polarizing as personal viewpoints. While the public health and medical community is aware of the issue, [41] partnering more frequently with technology and social media platforms to stay ahead of this movement may lead to policy and practice changes that curb these concerning activities.

Limitations.—To assess feasibility of engaging this hard-to-reach population, this study was restricted to interviews with influencers from one network, which resulted in limited diversity of the respondent sample. In the future, including more diverse networks (e.g., networks comprised of influencers of color and male influencers) and their member influencers in the study will create a more complete picture of anti-vaccine influencers on social media. Additionally, while we spoke with 15 influencers with anti-vaccine views, only one influencer actively posted anti-vaccine messages on her platform, indicating that the population of anti-vaccine posters on social media is an even harder to engage population. Engaging more of this kind of messenger– those who hold strong anti-vaccine beliefs and are not afraid to share them – is critical to further uncovering where these conversations start and how they spread. Continuing to build trust with online influencer networks and the influencer networks may open doors to this community in the future.

Conclusions

Social media influencers have the potential to reach an extremely wide audience, potentially vastly wider than traditional communication channels. While the majority of influencers we spoke with do not share their vaccine views on their platform, understanding the perceptions, beliefs, and motivators among non-vaccinating online influencers is important because there are other influencers like them who are actively sharing anti-vaccine content on social

media. The public health and medical communities can be more proactive in monitoring and understanding this audience. Additionally, they should partner with influencers to counterbalance the anti-vaccine messages that are pervasive and influential on social media.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

References

1. HealthyPeople 2020. (2020). Immunization and Infectious Diseases. In HealthyPeople 2020. Retrieved from: https://www.healthypeople.gov/2020/topicsobjectives/topic/immunization-and-infectious-diseases on February 7, 2020.
2. World Health Organization. Ten threats to global health in 2019. Accessible at: https://www.who.int/news-room/feature-stories/ten-threats-to-global-health-in-2019. Last accessed May 29, 2020.
3. Statista.com. (2020). Global digital population as of April 2020. Statista.com. Accessed at: https://www.statista.com/statistics/617136/digital-population-worldwide/ on May 27, 2020.
4. Pew Research Center. (2019). Social Media Fact Sheet. Accessed at: https://www.pewresearch.org/internet/fact-sheet/social-media/ on December 16, 2019.
5. Burke-Garcia A. (2019). Influencing Health: A Comprehensive Guide to Working with Online Influencers. Productivity Press.
6. Mirreh M. (2017). PI predictions: 2018 will be the year of the influencer. INside Performance Marketing. Retrieved from https://performancein.com/news/2017/12/29/pi-predictions-2018-will-be-the-year-influencer/ on June 11, 2018.
7. Uzunoğlu E, & Kip SM (2014). Brand communication through digital influencers: Leveraging blogger engagement. International Journal of Information Management, 34(5), 592–602.
8. Influencer Marketing Hub. (2020). The State of Influencer Marketing 2020: Benchmark Report. Available at: https://influencermarketinghub.com/influencer-marketing-benchmark-report-2020/. accessed July 21, 2020.
9. Casaló LV, Flavián C, & Ibáñez-Sánchez S. (2018). Influencers on Instagram: Antecedents and consequences of opinion leadership. Journal of Business Research. doi:10.1016/j.jbusres.2018.07.005
10. Burke-Garcia A. (2017). Opinion Leaders for Health: Formative Research with Bloggers about Health Information Dissemination (Doctoral dissertation).
11. Burke-Garcia A, Berry CN, Kreps GL, & Wright KB (2017, 1). The power & perspective of mommy bloggers: Formative research with social media opinion leaders about HPV vaccination. In Proceedings of the 50th Hawaii International Conference on System Sciences.
12. Burke-Garcia A, Kreps GL, & Wright KB (2018). Perceptions about disseminating health information among mommy bloggers: quantitative study. JMIR Research Protocols, 7(4), e116. [PubMed: 29691204]
13. Wright K, Fisher C, Rising C, Burke-Garcia A, Afanaseva D, & Cai X. (2019). Partnering with mommy bloggers to disseminate breast cancer risk information: social media intervention. Journal of Medical Internet Research, 21(3), e12441. [PubMed: 30843866]
14. Kearney MD, Selvan P, Hauer MK, Leader AE, & Massey PM (2019) Characterizing HPV vaccine sentiments and content on Instagram. Health Education and Behavior, 46(2S), 37–48. [PubMed: 31742459]
15. Chen T, & Dredze M. (2018). Vaccine images on Twitter: Analysis of what images are shared. Journal of Medical Internet Research, 20, e130 [PubMed: 29615386]
16. Song MY-J, & Gruzd A. (2017). Examining sentiments and popularity of pro- and anti-vaccination videos on YouTube. In Proceedings of the 8th International Conference on Social Media & Society (Article 17). New York, NY: ACM.
17. Blankenship EB (2018). Sentiment, contents, and retweets: a study of two vaccine-related twitter datasets. The Permanente Journal, 22: 17–138.

18. Kang GJ, Ewing-Nelson SR, Mackey L, Schlitt JT, Marathe A, Abbas KM, & Swarup S. (2017). Semantic network analysis of vaccine sentiment in online social media. Vaccine, 35, 29, 3621–3638. [PubMed: 28554500]
19. Ortiz RR, Smith A, Coyne-Beasley T. (2019). A systematic literature review to examine the potential for social media to impact HPV vaccine uptake and awareness, knowledge, and attitudes about HPV and HPV vaccination. Hum Vaccin Immunother, 15(7–8), 1465–1475. [PubMed: 30779682]
20. Newman PA, Logie CH, Lacombe-Duncan A, Baiden P, Tepjan S, Rubincam C, et al. (2018) Parents' uptake of human papillomavirus vaccines for their children: a systematic review and meta-analysis of observational studies. BMJ Open, 20, 8, 4, e019206.
21. Dyda A, King C, Dey A, Leask J, Dunn AG (2020). A systematic review of studies that measure parental vaccine attitudes and beliefs in childhood vaccination. BMC Public Health, 20,1, 1253 [PubMed: 32807124]
22. Braun V, Clarke V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3, 2, 77–101
23. Ortiz-Sánchez E, Velando-Soriano A, Pradas-Hernández L, Vargas-Román K, Gómez-Urquiza JL, Cañadas-De la Fuente GA, & Albendín-García L. (2020). Analysis of the Anti-Vaccine Movement in Social Networks: A Systematic Review. International journal of environmental research and public health, 17(15), 5394.
24. Hoffman BL, Felter EM, Chu KH, Shensa A, Hermann C, Wolynn T, Williams D, & Primack BA (2019). It's not all about autism: The emerging landscape of anti-vaccination sentiment on Facebook. Vaccine, 37(16), 2216–2223. [PubMed: 30905530]
25. Broniatowski DA, Jamison AM, Qi S, AlKulaib L, Chen T, Benton A, Quinn SC, & Dredze M. (2018). Weaponized Health Communication: Twitter Bots and Russian Trolls Amplify the Vaccine Debate. American journal of public health, 108(10), 1378–1384. [PubMed: 30138075]
26. Duplaga M. (2020). The use of fitness influencers' websites by young adult women: A cross-sectional study. Int J Environ Res Public Health, 17, 17, 6360.
27. Lee C, Whetten K, Omer S, Pan W, & Salmon D. (2016). Hurdles to herd immunity: Distrust of government and vaccine refusal in the US, 2002–2003. Vaccine, 34, 34, 3972–3978. [PubMed: 27344291]
28. Marlow LA, Waller J, & Wardle J. (2007). Trust and experience as predictors of HPV vaccine acceptance. Human Vaccines, 3,5, 171–175. [PubMed: 17622801]
29. Camporesi S, Vaccarella M, Davis M. (2017). Investigating public trust in expert knowledge: Narrative, ethics, and engagement. J Bioeth Inq, 14(1):23–30. [PubMed: 28144901]
30. Sobo EJ (2016). What is herd immunity, and how does it relate to pediatric vaccination uptake? US parent perspectives. Social Science and & Medicine, 165,187–195.
31. Leask J, Chapman S, Hawe P, Burgess M. (2006) What maintains parental support for vaccination when challenged by anti-vaccination messages? A qualitative study. Vaccine, 24(49–50), 7238–45. [PubMed: 17052810]
32. Miller CL, & Strachan SM (2020). Understanding the role of mother guilt and self-compassion in health behaviors in mothers with young children. Women & health, 60(7), 763–775. [PubMed: 31937201]
33. Fraser MR (2019). Blinding Me with Science: Complementary "Head" and "Heart" Messages Are Needed to Counter Rising Vaccine Hesitancy. Journal of public health management and practice: JPHMP, 25(5), 511–514. [PubMed: 31348167]
34. Haase N, Schmid P, & Betsch C. (2020). Impact of disease risk on the narrative bias in vaccination risk perceptions. Psychology & health, 35(3), 346–365. [PubMed: 31480866]
35. Centers for Disease Control and Prevention. (2019). Measles Cases and Outbreaks, 2019. Accessible at: https://www.cdc.gov/measles/cases-outbreaks.html Last accessed on July 20, 2020.
36. Mischlinger J, Muranaka R, Bühler S, & Ramharter M. (2020). Measles, Vaccines, and Types of Perception Bias in Public Debates. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America, 70(6), 1258–1259.

37. Pew Research Center. The Intersection of Health Care, Social Media, and Digital Strategy. Accessible at: https://www.pewresearch.org/internet/2014/01/25/the-intersection-of-health-care-social-media-and-digital-strategy/. Last accessed on May 30, 2020.

38. Isaac BM, Zucker JR, MacGregor J, et al. (2017). Notes from the Field: Use of Social Media as a Communication Tool During a Mumps Outbreak - New York City, 2015. MMWR Morb Mortal Wkly Rep, 66, 60–61. [PubMed: 28103208]

39. Elkin LE, Pullon SRH, Stubbe MH (2020). 'Should I vaccinate my child?' comparing the displayed stances of vaccine information retrieved from Google, Facebook and YouTube. Vaccine, 38, 13, 2771–2778. [PubMed: 32107061]

40. Ruiz JB, & Bell RA (2014). Understanding vaccination resistance: vaccine search term selection bias and the valence of retrieved information. Vaccine, 32(44), 5776–5780. [PubMed: 25176640]

41. Wang Y, McKee M, Torbica A, Stuckler D. (2019). Systematic Literature Review on the Spread of Health-related Misinformation on Social Media. Soc Sci Med, 240, 112552. [PubMed: 31561111]

Table 1.

Themes and Sub-Themes, with Illustrative Quotes

Theme	Sub- Theme	Quote
Views on vaccination	Origin of views	
	Experience of self or others	*"For me, it's personal….When you meet these families that are dealing with vaccine injury on a very personal level, there's no amount of talk or blogs or research that's going to take away the experience and what you see with your own eyes."*
	Role of the gov't and pharmaceutical industry	*"…and governments, legally, are protected against any kind of lawsuit, even if it's because they were negligent"*
	Balancing risk vs. benefit	*"I've weighed the risk: the known risk of HPV against what I see as the unknown risk of the vaccination."*
	Parental autonomy	*"I think parents have a right to do what they feel is best for their child and their home, not really keeping in mind the community aspect."*
Conducting research for a post	Accessibility of health information	*"With all of the information that's out there, we've kind of been empowered to research for ourselves."*
	Source credibility: physicians	*"Because they are doctors, we do need to heed their counsel, so we should listen, and they should come alongside of us as we try to navigate parenting because every situation is different."*
	Source credibility: websites	*"I'll go to the CDC website, but I have to interpret the data for myself."*
Writing about vaccination	Reason for writing	*"I really do want to help people and I've been able to get the information I need already to make decisions about vaccination"*
	Response to anti-vaccine content	*"I either get the people who are totally in agreement or those who are totally not in agreement. It's black or white.*

Table 2.

Participant Characteristics

Gender	**N**	**%**
Female	15	100
Male	0	0
Race		
Caucasian	14	93
American	1	7
Ethnicity		
Non-Hispanic	13	87
Hispanic	2	13
Marital Status		
Married	15	100
Single, Divorced, or Widowed	0	0
Education Level		
HS diploma	1	6
Associate degree, some college	4	27
College degree	7	47
Graduate school/graduate degree	3	20
Number of Children		
1 or 2	7	47
3 or 4	5	33
More than 5	3	20
Vaccine Stance (If your doctor recommends a vaccine for your child, how likely are you to get it?)		
Never, we don’t vaccinate our child(ren)	6	40
Depends on the vaccine	9	60
We vaccinate but use an alternative schedule	0	0

Table 3.

Summary of Findings and Recommendations

Finding	Recommendation
New messengers are needed	Partner with non-traditional sources who are seen as credible to mothers, such as online influencers
New messages are needed	Find common ground with those who are vaccine hesitant, as previous messages promoting herd immunity or inducing guilt for not vaccinating do not resonate Utilize evidence-based storytelling to promote vaccination and counter claims of misinformation
New vaccines are needed	Communicate concerns about vaccine ingredients and the desire for personalized vaccines to the pharmaceutical industry
Balancing risk	Help parents understand accurate risk of vaccine vs. disease; dispel misguided beliefs about side effects
Social media and new technology	Collaborate with social media and technology companies to ensure appropriate and responsible use of these platforms to promote vaccination