

An Analysis of Digital Media Data to Understand Parents' Concerns During the COVID-19 Pandemic to Enhance Effective Science Communication

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Abstract

Science and health journalists have incorporated digital media as a source for their daily news production process, but little is known about the potential impacts of using digital media data to inform the news production process in the context of a global pandemic, where information is rapidly changing. During the COVID-19 pandemic, families have struggled to ensure economic stability and good health as well as their children's learning and development. The Child Trends News Service sought to broaden access to science-based information to support families during the pandemic through television news, testing whether digital media can be used to understand parents' concerns, misconceptions, and needs in real time. This article presents that digital media data can supplement traditional ways of conducting audience research and help tailor relevant content for families to garner an average of 90 million views per report.

Keywords

digital media, television, social media

Introduction

The COVID-19 pandemic has heightened the emotional, economic, and educational stressors for families across the United States (Dym Bartlett & Vivrette, 2020). Specifically, Latinos and other underserved families have been disproportionately affected by COVID-19, as they face unprecedented challenges with unemployment, economic instability, and increased exposure to the virus through essential jobs and crowded housing (Fortuna et al., 2020; Oppel et al., 2020). More than a quarter of parents reported worsening mental health due to lack of social support and increased stress levels during the pandemic, and

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nearly 15 percent reported worsening behavioural health for their children (Patrick et al., 2020). In addition, parents have had to assume a larger role in their children's education and navigate how to best support learning at home; this is particularly true for Latino parents (Latino Decisions & Abriendo Puertas/Opening Doors, 2020). Several recent studies suggest that achievement gaps will widen most drastically for racially and socioeconomically disadvantaged groups (Goldstein, 2020; McKinsey & Company, 2020).

As Latinos and other families struggle to ensure economic stability, good health, and their children's learning and development, there is a critical need to broaden their access to science-based information on how to prevent the spread of the virus, support mental health, and navigate online learning during the pandemic (Alsan et al., 2020; Tangcharoensathien et al., 2020). It is also critical to tailor these messages to audiences' current beliefs, concerns, and knowledge gaps (National Academies of Sciences, Engineering, and Medicine, 2017). In the present study, we explore the potential for using digital media data to respond more effectively to parents' real-time concerns in an ongoing crisis.

In response to widening economic and educational disparities during the pandemic, Child Trends (a US-based research non profit) requested and received a Rapid Response grant to harness the Child Trends News Service (CTNS) platform to educate on the science of virus transmission and to pilot the use of digital media data available online to inform the development of news content aimed at reaching and engaging parents. Since 2017, the CTNS project has leveraged local TV news—the public's primary news source (Media Insight Project, 2014; Pew Research Center, 2019)—to share monthly news reports featuring rigorous science-based parenting information in English and Spanish. The project has conducted extensive audience research with Latino parents through surveys and focus groups to inform the messaging and featured news report topics (Torres et al., 2018). As part of this grant, the CTNS developed five news reports to address some of parents' emerging information needs.

The present study aims to explore whether and how digital media data can be used to help tailor messaging to address parents' concerns, misconceptions, and needs amid an ongoing crisis. Researchers are increasingly using digital media data, specifically web searches and social media shares and posts, to better understand and assess public opinion (Singh et al., 2020). Our primary research question is: Can digital media data inform the development of relevant content to meet the informational needs of parents during the COVID-19 pandemic? Additional research questions include: (1) Do parents show increased interest in the selected topics before they are featured in the news reports? (2) What concerns do parents share and what information do they need? and (3) Are there misunderstandings about the five news reports topics?

To answer these questions, we gathered real-time information in both English and Spanish on parents' needs and concerns using digital media platforms (Facebook, Twitter, and Google Trends), since these platforms are widely used in the United States and other countries and provide access to their data (Al-Jenaibi, 2016). This audience research helped to inform five news reports focused on parenting during COVID-19, with a specific focus on reaching Latino parents. These approaches supplement traditional methods of audience research, such as in-person focus groups and surveys. Understanding audiences' needs and concerns are important components to news gathering and developing messages that resonate with target audiences (Hornik & Yanovitzky, 2003). Gathering real-time data on what parents share on social media and the information they seek through online searches allowed the CTNS team to develop science-based messaging through news reports that addressed emerging parenting concerns.

Using Social Media to Tailor Science Communication Messages

Despite recent growth in access to online news and social media for scientific content, local TV news is still the primary source of news for most adults in the United States (National Academies of Sciences,

Engineering, and Medicine, 2017; Pew Research Center, 2019; The Knight Foundation, 2018). Television news continues to be a vital and trusted source (Schmidt, 2019), and recent data finds that the public trusts TV news more than other media, including online sources (UK Office of Communications, 2020). Not surprisingly, previous research has found that communicating scientific knowledge through TV news can have an impact on audiences' appreciation and value for science (Mares et al., 1999; Southwell & Torres, 2006). In addition, local TV news offers a unique venue to reach large populations with lower income and education levels and from underserved racial groups, including Blacks and Latinos (Barthel et al., 2019; Matsa, 2018).

However, communicating science-based information is complex, as multiple factors can influence the audiences' interpretation of the messages, including the alignment of content, format, and channels of communication with the audiences' needs, preferences, and trusted sources of information (Guenther & Joubert, 2017; Harmatiy, 2021; National Academies of Sciences, Engineering, and Medicine, 2017). Some frameworks suggest that using audience research to inform research-based messaging approaches can help build knowledge, increase the value of science, and encourage the adoption of behaviours (Hornik & Yanovitzky, 2003). Considering audiences' needs and perspectives provides a responsive approach to communicating science; however, there is a need to develop detailed approaches for understanding audiences' responses to situations of uncertainty and science-related controversy that can be implemented on a large scale (National Academies of Sciences, Engineering, and Medicine, 2017).

While still a relatively new practice, news media professionals have begun to use digital media data as an alternative source to explore the preferences of news consumers, find breaking news, provide context to broaden the coverage of specific topics, and identify people for interviews (Lecheler & Kruikemeier, 2016). Online sources, such as Twitter or Google Trends, have not replaced traditional data sources but instead complement them, and most journalists now combine newsgathering via telephone, press conferences, and personal interviews with digital media data (Lecheler & Kruikemeier, 2016). Like other news media professionals, science and health journalists have incorporated online news sourcing techniques into their daily news production process (Tanner et al., 2015). Given the increasing popularity of using digital media data to inform news development, it is crucial to better understand and test approaches for tailoring news content based on audiences' interests as demonstrated by online searches and behaviours.

Digital media data sources offer several key advantages compared to traditional data sources, including organic insights into audiences' concerns, real-time data, and low-cost collection (Schober et al., 2016; Vyas et al., 2020). Content posted online are spontaneous and curated by the creator (Pasek et al., 2018; Schober et al., 2016), which allow a more organic window into public opinion. In addition, the open-ended nature of social media lets researchers pull out themes and details that they may have been unaware of when developing surveys and/or interview questions (Pasek et al., 2018; Schober et al., 2016). This open-endedness enables a 'bottom-up' or deductive understanding of audiences' concerns that can be difficult to achieve through surveys. Another core advantage of digital media data is that it can be available in real time. Researchers and journalists can gather tweets, Google search queries, and public Facebook comments as users post them—allowing researchers and journalists to collect data about emerging issues in a fraction of the time it takes to field a traditional survey. The real-time nature of digital media data has been leveraged to understand public responses to COVID-19, with research exploring the spread of misinformation and emotional responses around the pandemic (Jimenez-Sotomayor et al., 2020; Kouzy et al., 2020; National Science Foundation, 2020). Digital media data are also often free or low cost, which extends the reach of such analysis and supports open science and replicability (Chen et al., 2020). Digital media sources allow researchers to collect data retroactively and in real time to study the effects of COVID-19 in ways that would not have been possible using traditional research methods.

Despite its advantages and increasing use by journalists and science communicators, little is known about the potential impacts of using digital media data to inform science communication in the context of a global pandemic, where information is rapidly changing. Given that more people are online than ever before (Beech, 2020), digital media data provide a unique opportunity for science communicators and news professionals to tailor content to the public's most pressing concerns and needs in real time. Science communicators need to better understand and test approaches for tailoring and designing news content based on the public's interests and needs for scientific knowledge as demonstrated by online searches and behaviours.

The Child Trends News Service and Rapid Response Project

The CTNS project has sought to leverage public attention to local TV news to broaden US parents and families' access and exposure to research-based information, with a focus on reaching Latino parents and underserved parents more broadly. The project is a collaborative partnership between Child Trends and Ivanhoe Broadcast News, a leading TV syndicated news company. Now in its third year of production, the CTNS airs in over 50 percent of all US TV markets, amassing an average of 32 million views per report. The project bridges research and news media to build knowledge, improve perceptions of and value for science, and encourage the adoption of science-based parenting behaviours.¹ Previous research has established the efficacy of local TV news as a conduit for building knowledge of and value for science, technology, engineering, and math research and for triggering behaviours associated with support for science, such as sharing information acquired through local TV news with peers (Southwell & Torres, 2006).

The Rapid Response project leveraged this established Child Trends programme to harness digital media data from Facebook, Twitter, and Google Trends to assess parents' knowledge, concerns, and practices related to COVID-19 to inform the development of five news reports. The project leveraged the vast reach of the CTNS platform to deliver research-informed news reports to large numbers of TV audiences, with a specific focus on parents. The news reports were also promoted beyond local TV news through Abriendo Puertas/Opening Doors, the largest US parenting programme serving low-income Latinos. Figure 1 depicts the logic underlying this project's approach.

Methods

Our primary research question is: Can digital media data inform the development of relevant content to meet the informational needs of low-income parents during the COVID-19 pandemic? Additional research questions include: (1) Do parents show increased interest in the selected topics before they are featured in the news reports? (2) What concerns do parents share and what information do they need? and (3) Are there misunderstandings about the five news reports topics? To answer these questions, we gathered information on parents' real-time needs and concerns in both English and Spanish to inform five news reports focused on parenting during the COVID-19 pandemic, with a specific focus on reaching Latino parents.

Data Collection

There were four primary stages of data collection: (1) topic identification through input from CTNS advisory panel members and a qualitative review of Facebook parenting groups; (2) development of search terms (keywords); (3) collection of relevant tweets; and (4) collection of Google Trends search data.

Topic identification.

To select the five rapid response report topics, we first met and sought input from the CTNS project's advisory panel, an interdisciplinary group of 12 experts in child development, news media, and communication science, and practitioners working with families at the community level. We then conducted informal scans of public Facebook parenting groups in English and Spanish to identify parents' primary concerns and information needs during the pandemic (Figure 1). We utilised Facebook due to research that finds that 79 percent of parents 'get useful information' from social media, and three quarters (74%) of parents use Facebook (Pew, 2015). The study team identified 22 Facebook parenting groups organised around different parenting topics (e.g., parents during the pandemic; Table 1). During the first three weeks of April 2020, the team reviewed and qualitatively coded Facebook posts for common topics of interest/discussion and engagement (comments, shares, and likes).

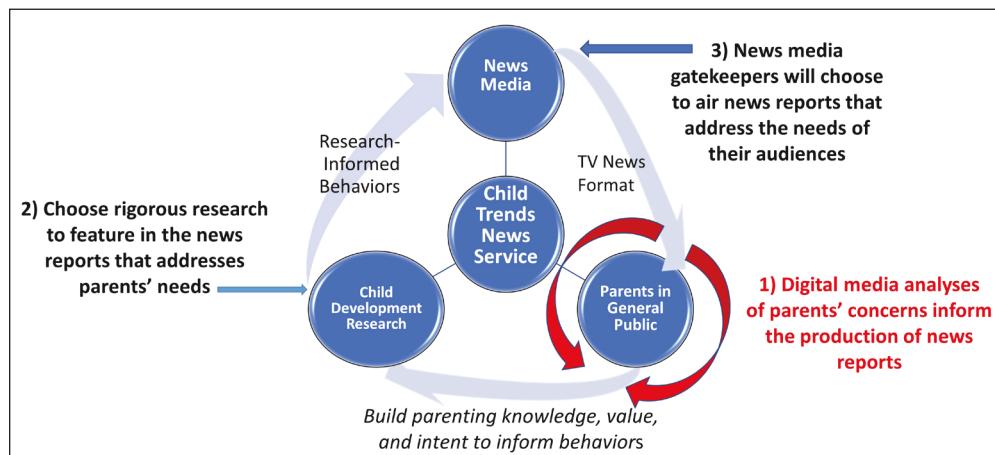


Figure 1. Using Digital Media Data to Enhance the Communication Process—Research to Practice

Source: The authors.

Table 1. Facebook Parenting Groups

Charlotte Parenting Support Group	Conscious Parenting Public Group
Consejos para mamás ('Advice for moms')	New York City Parents And Families
Cosas de padres ('Parenting things')	Raising Independent Kids
Padres luchando unidos por nuestros hijos en las escuelas ('Parents fighting together for our children in schools')	Upper West Side Mamas
Padres y madres activos en la creación de hijos e hijas sanos ('Fathers and mothers active in raising healthy sons and daughters')	Upper East Side Moms
Parenting in poverty	Brooklyn Baby Hui
Parenting tips	NYC Moms-Upper East Side
Parenting in the pandemic	Circle of Moms (Chicago)
Main Street Mamas (San Francisco)	Washington DC Area Moms
Portland Mamas	Bethesda Potomac Rockville Moms
Red Tricycle Families Seattle	LA Mommies

Source: The authors.

Development of search terms.

Once key topics of concern and need were identified through Facebook scans, the research team developed a list of common terms (i.e., search terms) used in Facebook discussions and tested them to see whether they had enough traffic in Google Trends searches and Twitter posts to allow for analysis (Table 2). Search terms were developed in both English and Spanish to reflect the idiomatic terms parents would use for particular concepts (e.g., ‘screen time during quarantine’ or ‘niños tiempo con pantalla’).

Collection of tweets.

Using the pre-identified search terms and Twitter API, the team collected a sample of tweets that included the identified terms. For example, the keyword ‘kid + screen time’ might collect a tweet reading, ‘I’m worried about the increase in my kid’s screen time during the lockdown’. The Twitter API allows users to programmatically (i.e., using code) retrieve a random sample of tweets based on a keyword search (see McCormick et al., 2017, for a detailed description of the use of Twitter API in social science research). Data collected from Twitter are commonly used in public health, marketing, and social science research (respectively, Chae, 2015; Sinnenberg et al., 2017; McCormick et al., 2017). Our data included a sample of tweets (up to 500 per day, selected at random from those returned by the Twitter API) in both English and Spanish from 15 March 2020 to the time the news reports started development (ranging from 22 April to 11 May 2020, depending on the story). Given the need to analyse the tweets in real time, the research team chose to limit the Twitter data to a sample of 500 tweets per topic each day to rapidly conduct thematic analysis. Previous research has shown that a sample of tweets can be sufficient for obtaining results that are representative of the universe of tweets (see Kim et al., 2018, for a discussion of sampling methods on Twitter, which finds that most researchers use samples of tweets that total in the 1,000–10,000 range).

Collection of Google Trends search data.

In addition, we collected data from the Google Health API, an application programming interface that allows researchers—after submitting their research question to Google for approval—to collect the number of weekly searches for individual terms. These searches are not limited to health topics and can be aggregated to the metro area, state, or national level (Google Trends, <https://support.google.com/trends/answer/4365538?hl=en>). These data included the weekly search volume for each search term from 1 January 2020 to the time the news reports started development, allowing the team to collect data on parents’ concerns in real time. We excluded search terms that did not create enough search volume and hence are not reported by Google. Google Trends data are reported as normalised search volumes, that is, a metric of relative search frequency compared to all searches at the report time/geography. Data only include results from a random sample of users, on search terms that are sufficiently popular to meet their internal reporting threshold. Google provides a helpful guide for interpretation.² We followed this guide to assess how search volume changed over time. For each topic, we were more interested in changes over time (e.g., spikes and declines in interest) rather than the reported numbers themselves, as we were trying to understand if there was an increased interest and need for information for each of the selected topics.

Data Analysis

To answer our first research question (do parents show interest in the selected topics before they are featured in the news reports?), we evaluated changes in search frequencies over time that could signal an

Table 2. Keywords in English and Spanish for Each Story

Story	Google Search Terms	Twitter Keywords
Stress	Spanish: niños or hijos stress, niños or hijos seguridades, niños or hijos rutina, niños or hijos estres English: children or kids stress, mindfulness kids or children, regulation children or kids, reassurance children or kids, routines children or kids	Spanish: hija OR hija OR niño OR niña AND (stress OR ansiedad or salud mental) AND corona OR COVID English: child OR kid AND (stress OR anxiety or mental health) and corona or COVID Spanish: hija OR hijo aprendizaje COVID OR corona, clases online corona OR COVID
E-learning	Spanish: crianza positiva, aprendizaje online, clases online, matemáticas en casa English: positive parenting, learning at home, math at home, home math	English: learning at home OR online classes OR online learning AND corona or COVID^a Spanish: uso de pantalla corona OR COVID, tiempo en pantalla COVID OR corona English: screen time COVID OR corona
Screen Time	Spanish: niños tiempo con pantalla, tiempo con pantalla,^b limites tiempo con pantalla English: screen time kids, screen time, common sense media wide-open school, screen time limits	Spanish: corona OR COVID modelo, corona OR COVID predicción,^c corona OR COVID imperial college^d English: corona OR COVID model, corona OR COVID prediction, corona OR COVID imperial college
Modelling	Spanish: COVID predicción, coronavirus predicción, coronavirus predicción impreciso, coronavirus predicción sobreestima, coronavirus predicción sobreestimación, coronavirus predicción error, COVID predicción impreciso, COVID predicción sobreestima, COVID predicción sobreestimación, COVID predicción error English: coronavirus model, coronavirus prediction, coronavirus projection, corona model, corona prediction, corona projection, COVID model, COVID prediction, COVID projection, corona prediction error	Spanish: vapear jóvenes corona OR COVID English: teens vaping corona OR COVID
Vaping	Spanish: vapear coronavirus, vapear COVID19, vapear coronavirus jóvenes, vapear COVID19 jóvenes English: vaping, vaping COVID, vaping coronavirus, vaping corona, teens vaping, kids vaping, what is vaping	

Source: The authors.

Notes: ^aThis did not include 'remote school', which is a term that became more popular during summer 2020 after the analysis was completed.

^bThis is the brand name of the programme, so it is not translated.

^cThis is a wild card character to allow variation in the accent.

^dThis search term refers to a model created by Imperial College London which was covered frequently in news stories around the time that the data was collected.

increase in interest and/or need from parents. Quantitative analysis of changes in search frequencies looked at how all searches for a given topic increased or decreased in relative frequency over the study period³—looking in particular for temporally specific spikes or drops in interest. In addition, we also investigated differences in search patterns between English and Spanish-language searches.

For our second and third research questions (information needs and whether there were misunderstandings), we qualitatively coded the Twitter content to identify frequently mentioned themes, ideas, and concerns. Given the need to develop news stories that respond to parents' real-time concerns/questions, we limited ourselves to a straightforward thematic analysis of the common words and themes mentioned in tweets related to a particular set of search terms. We started by looking at the list of tweets to identify common themes or ideas. Once a theme was identified (e.g., too much time in front of a screen), we searched for other tweets that mentioned similar words or concepts. After we identified at least 10 tweets with a common theme, we coded the theme as a relevant concern that could inform the news report content. This allowed the identification of unanticipated concerns, questions, and sources of misinformation in an organic context.

Findings

Facebook Scans

The search of Facebook parenting groups found that parents were actively seeking information on how to help their children regulate their emotions and behaviours. For instance, parents discussed issues such as increased biting, sleep issues, and unhealthy coping behaviours as a result of COVID-19 stressors. At the same time, parents shared that strategies they had previously employed to calm their children or correct their behaviour (such as time outs) had lost effectiveness over the course of the pandemic. Parents also requested advice on how to support learning at home and were concerned about their children's increased screen time and social media use, often reporting a lack of knowledge of alternative safe activities. Parents were unsure how to continue addressing behavioural issues and regularly requested links to free online resources, parenting courses, or therapy. These Facebook posts allowed the team to identify three salient topics (children and stress, online learning, and screen time). In addition, the research team identified topics that were prevalent on Twitter at the time, including the effects of vaping on COVID-19 susceptibility (Miech et al., 2019) and predictive models of virus transmission. Misleading information on both the safety of vaping and the estimations and usefulness of models led the research team to select these topics for reporting, following a discussion with the advisory panel. Table 3 provides a full list of the CTNS reports produced, including links to each news story, date aired, and total national views.

Research Question 1: Changes in Interests Around the Selected Topics

We found significant increases in Google Trends searches for each of the five news report topics at the beginning of the pandemic, particularly in English, demonstrating overall interest in the selected topics.

For English-language searches related to children and stress during the pandemic, the number of searches steadily increased from early February through mid-April (Figure 2) and then began to decrease. Figure 2 (and all subsequent Google search graphs) shows the combined search volume for all relevant search terms over the course of the study for a broad view of how interest in the topic changed during the

Table 3. CTNS Rapid Response News Report Topics and Links

Topic	English-language Report	Spanish-language Report	Month Aired and Views ^a
Stress	https://www.youtube.com/watch?v=vCSiC6wh9fl	https://www.youtube.com/watch?v=sGcXPRZUPkc&feature=emb_title	May 132,025,413
E-learning	https://www.youtube.com/watch?v=wms3b4tyqlw&feature=emb_title	https://www.youtube.com/watch?v=b8zUxIdK6aA&feature=emb_title	May 61,740,140
Screen time	https://positiveparentingnews.org/news-reports/relax-screen-time-guidelines-right-now/	https://www.youtube.com/watch?v=VMr36v8O1z4&feature=emb_title	June 69,429,820
Modelling	https://www.youtube.com/watch?v=AEjmToNg5Q&feature=emb_title	https://www.youtube.com/watch?v=FnfQYXF9x1A&feature=emb_title	June 91,833,715
Vaping	https://www.youtube.com/watch?v=ABgr9R5on8l&feature=emb_title	https://www.youtube.com/watch?v=VSqrdZF8Cog&feature=emb_title	July 100,525,798

Source: The authors.

Note: ^aNumber of views is estimated using Nielsen data.

study period. Spanish-language searches showed a less consistent pattern, with peaks of interest in March and again in May (Figure 3).

For searches related to remote learning and COVID-19, we found that the volume of English-language Google searches increased substantially during the early phases of the pandemic (Figure 4). Between the end of February and late March, interest climbed steadily. While interest dipped for some time during April, it was climbing again by the beginning of May. Spanish-language search volume followed a

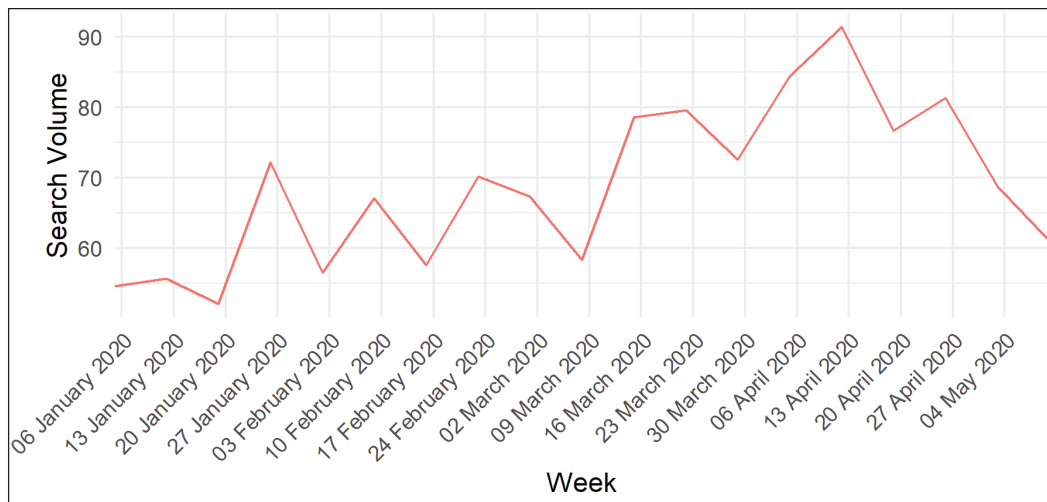


Figure 2. Stress English Language Search Volume

Source: The authors.

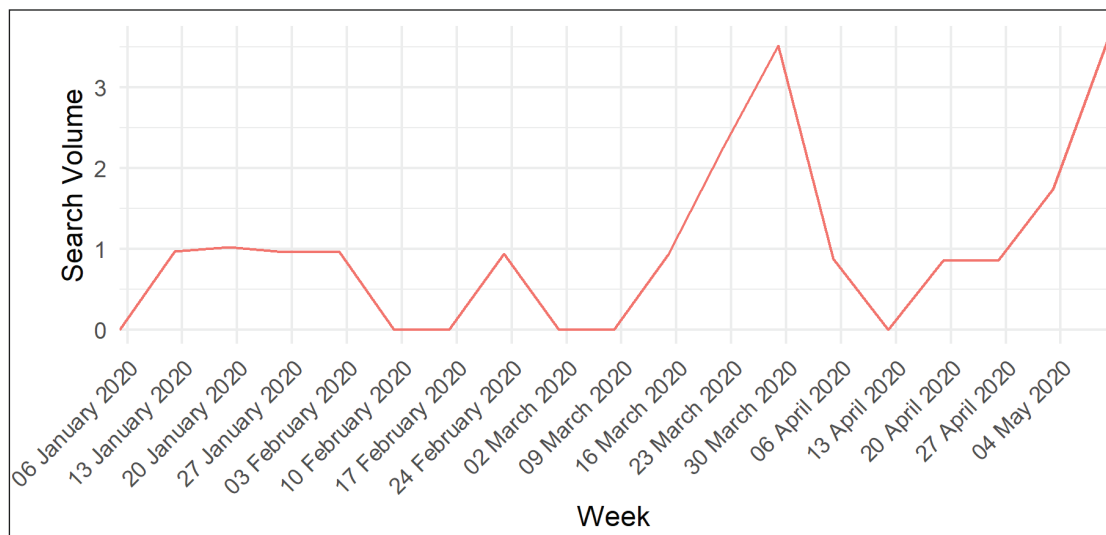


Figure 3. Stress Spanish Language Search Volume

Source: The authors.

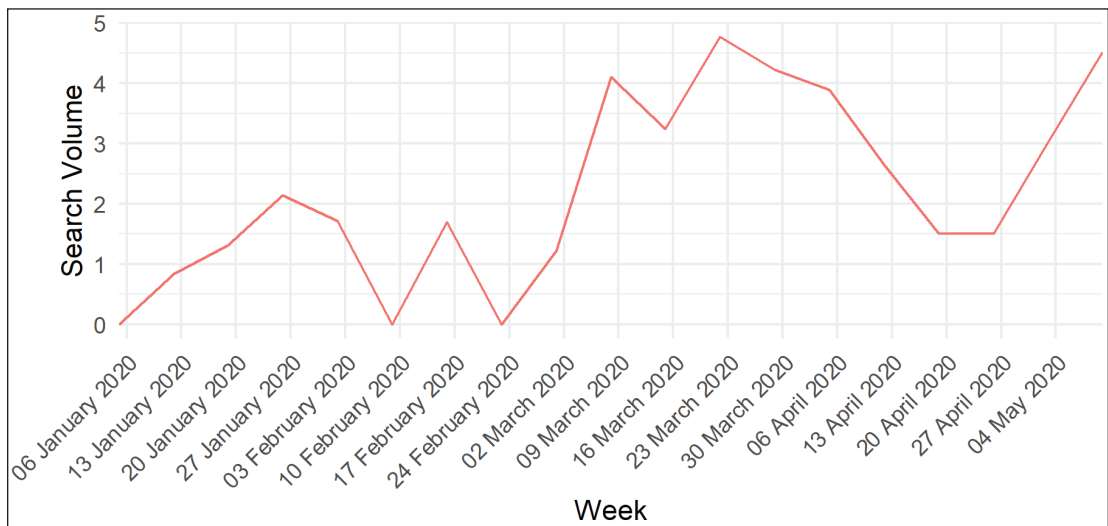


Figure 4. E-learning English Language Search Volume

Source: The authors.

similar pattern, climbing steadily from late February through mid-March and remaining elevated through May (Figure 5).

Because screen time guidelines and concerns differ greatly by age, we examined the search terms with added words for different ages: toddlers, teenagers, and children (Figure 6). English-language screen time searches found lower levels of concern among parents of toddlers and teenagers but showed elevated concern for parents of children—increasing steadily from mid-February and remaining high

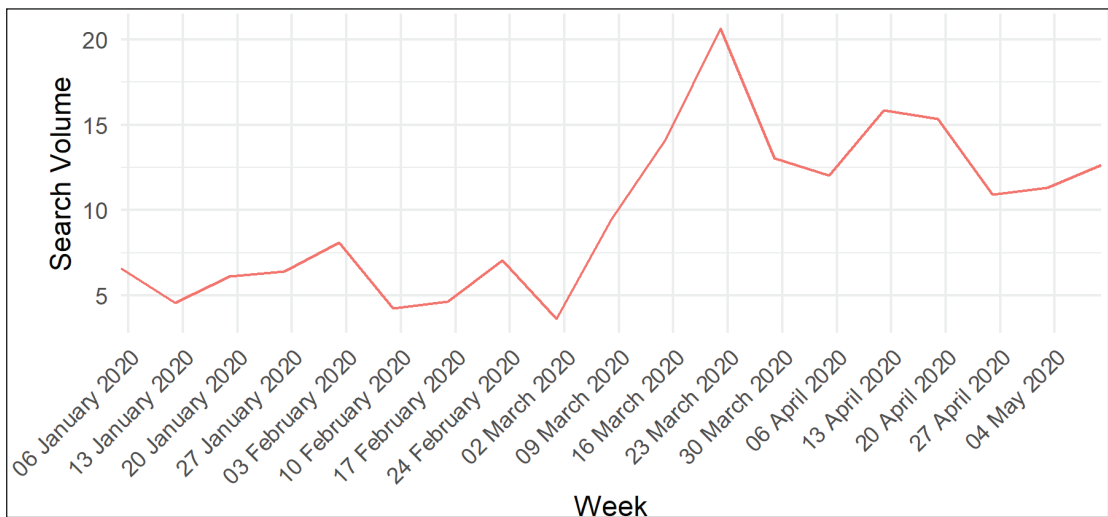


Figure 5. E-learning Spanish Language Search Volume

Source: The authors.

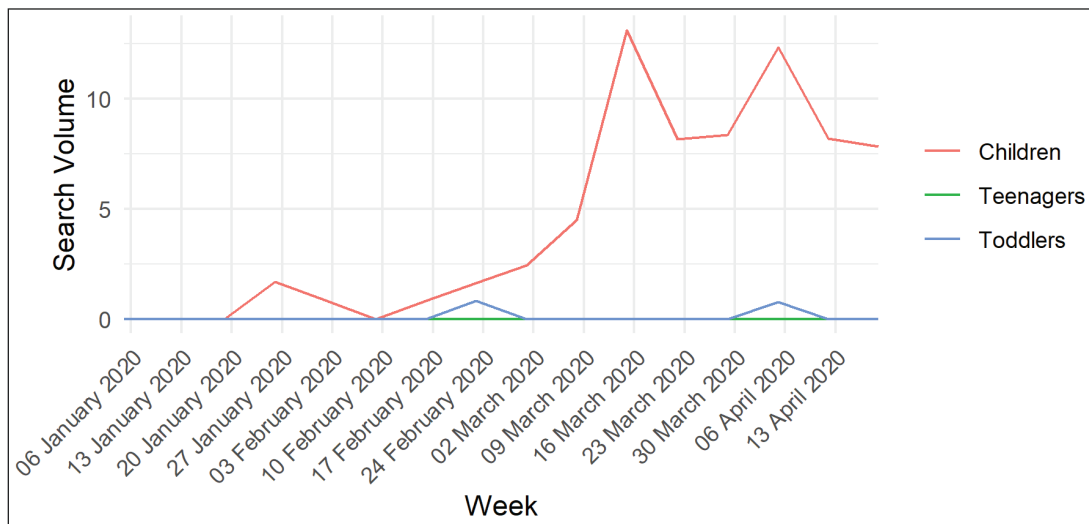


Figure 6. Screen Time English Language Search Volume

Source: The authors.

through the end of April. The volume of Spanish-language searches for the topic of screen time was not high enough for Google Trends to release data.

We considered three different dimensions to understand parents' concerns around predictive modelling of the pandemic, including 1) general searches for models/predictions, 2) specific searches for model errors, and 3) searches related to models being an overreaction (Figure 7). Unlike other topics, these choices were based on news stories that were prevalent in the news media and on Twitter at the time of

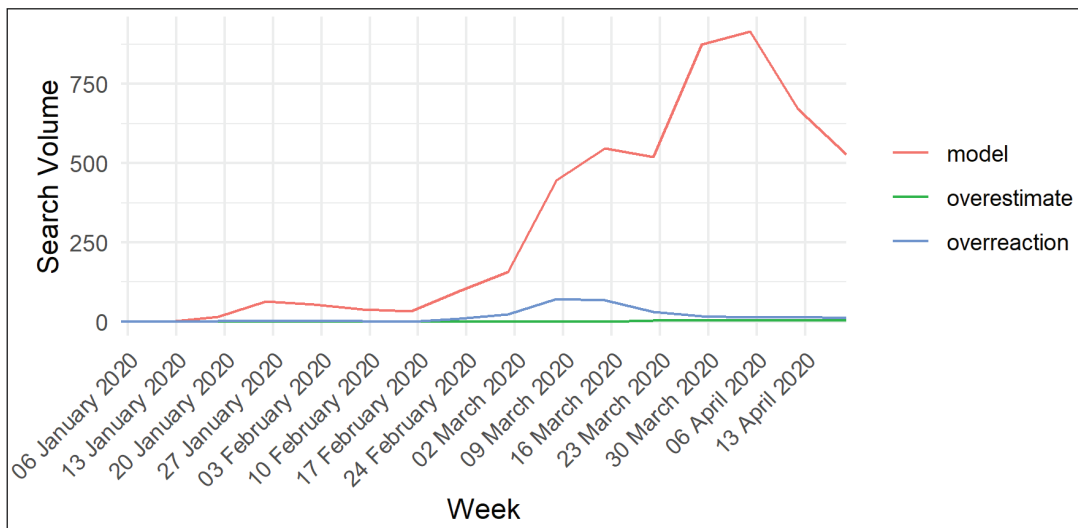


Figure 7. Modelling English Language Search Volume

Source: The authors.

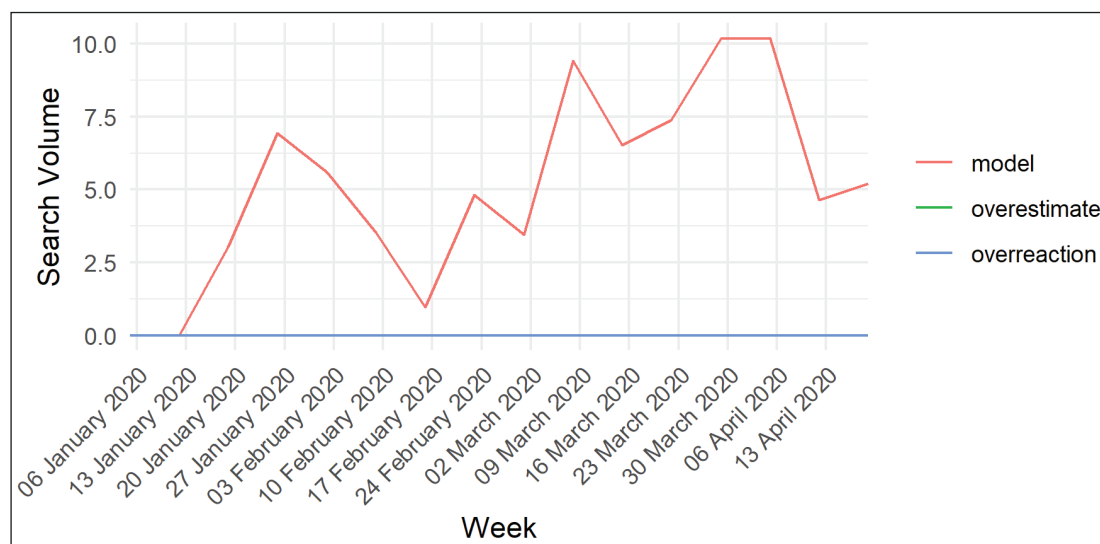


Figure 8. Modelling Spanish Language Search Volume

Source: The authors.

the study. There was a sharp rise in English-language searches for coronavirus modelling, peaking around the second week of April. We also saw searches related to coronavirus and modelling errors (search terms like ‘coronavirus model overestimate’ or ‘coronavirus error’) rising gradually. Searches for whether the current response to the pandemic was an overreaction also spiked sharply in the first few weeks of March (as stay-at-home orders started to be implemented) and continued to increase throughout April. By mid-March, about half as many people were searching for terms related to an ‘overreaction to coronavirus’ as for information about coronavirus modelling. While there was a smaller volume of Spanish-language searches, we found a very different pattern: an initial spike early in the pandemic on searches around coronavirus modelling but no large peak as was found in the English-language data. From these data, it appears that those who consume information in Spanish are not focusing on coronavirus model predictions at the same rate as those who consume information in English (Figure 8).

To inform the development of the story about vaping, we investigated both general interest in search terms related to ‘vaping and COVID’, as well as content specifically about ‘teens vaping and COVID’ (Figure 9). When looking at English-language searches for ‘vaping and COVID’, we saw a sharp rise in searches for questions around vaping and coronavirus during the first week of March, reaching a peak around March 20 before steeply declining. The base rate remained higher than historical values through the start of May but much lower than its peak. This may suggest that public interest and/or concern about the subject waned. There were not enough searches about the second search term, ‘teens, vaping and COVID’, for Google Trends to report results. In addition, there were not enough Spanish-language searches for Google Trends to report results on either search term.

Research Question 2: Parents’ Concerns

We sought to understand parents’ concerns and information needs by collecting and analysing online data from Twitter. We found that parents were particularly concerned about how to talk to their children

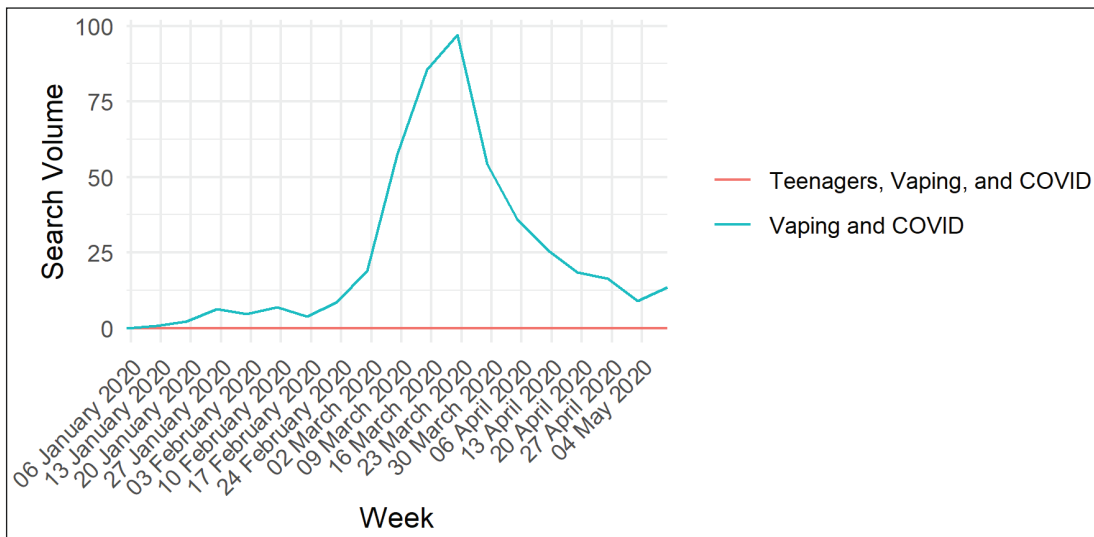


Figure 9. Vaping English Language Search Volume

Source: The authors.

about the dangers of COVID-19 while managing stress, worrying that ‘the COVID-19 crisis has placed additional stress on families and children...’ and that ‘children may feel increased stress and concerns for their parent’s safety due to COVID-19’. Many parents expressed anxiety about their children’s stress during remote learning (e.g., ‘online learning every day will be horrible for his anxiety and stress’). Additionally, there were substantial conversations on Twitter about increases in mental illness (especially anxiety and depression) among school-aged children; parents warned that ‘mental health concerns are extreme with students not being in school’ and worried that increased school closures and lockdowns will ‘lead to depression’. Spanish-language tweets described similar concerns, stressing the difficulty of the pandemic and lockdowns for children’s mental health, development, and stress. Parents and parent-serving organisations tweeted about the ‘significant negative impacts on child development and learning, as well as mental health’ [‘importantes impactos negativos en el desarrollo infantil y el aprendizaje, así como en la salud mental’], as well as the day-to-day stresses of having children potentially exposed to the virus. A gap that we identified in the conversations on children and stress was that there were very few solutions offered and minimal information provided about how to mitigate child stress.

The research team also found that both English- and Spanish-speaking parents were specifically concerned about the quality of online education and their children’s ability to be focused and motivated in online classes. Twitter users warned that ‘60 percent of kids say they’re “largely unmotivated” by online classes’ and urged to ‘just write this year off’. Spanish-speaking parents shared concerns about the difficulties of online learning, such as that ‘in online classes, I don’t understand ANYTHING’ [‘en las clases online no entendiendo NADA’], as well as the increased workload assigned to their children. English-language tweets included many concerns about equity in access to online education (for example, one Twitter user said, ‘for decades Indian Country has been left behind creating connectivity barriers that lead to ... children not being able to log in for lessons ...’).⁴

English-language tweets suggested that there was substantial concern among parents around the impact of the pandemic on screen time and confusion about screen time guidelines (from expert recommendations to relax the rules on screen time to alarmist articles on the amount of screen time kids

are getting). Many tweets implied that parents were already concerned about screen time and often have existing restrictions in place. For example, one parent asked, ‘Have you been looking for educational resources to ensure that your kids’ screen time is productive?’ and another requested ‘tips for how to make the most of screen time for kids who are cooped up at home’. Spanish-language conversations on Twitter around the topic of screen time and COVID-19 were minimal, with tweets primarily from educators and official resources offering recommendations. Nonetheless, the themes around parental concerns on increased screen time and resources for improving quality screen time were similar. One resource warned, ‘With the state of alarm, young people spend twice as much time in front of a screen’ [‘Con el estado de alarma los jóvenes pasan el doble de tiempo frente a una pantalla’]. The lower volume of conversations on screen time in Spanish could be for many reasons, including that screen time is of less concern to Spanish-speaking parents, or perhaps they are accessing information on this topic from an alternative source.

There were also ample English-language Twitter conversations regarding the accuracy and/or legitimacy of the coronavirus models (e.g., ‘The IHME coronavirus model is garbage today, was garbage when it first launched, and will remain garbage going forward’) and specifically highlighting the changes in the models’ predictions (e.g., ‘The #Coronavirus death prediction has dropped AGAIN. This time by 12%’). Tweets in Spanish were much less common and typically included neutrally-toned reporting of model numbers as shared by news outlets (e.g., ‘A model based on artificial intelligence predicts ‘catastrophic consequences’ of not continuing with the quarantine measures against COVID-19’ [‘Un modelo basado en inteligencia artificial predice ‘consecuencias catastróficas’ de no continuar con las medidas de cuarentena contra el COVID-19’]).

We found that English-language Twitter conversations around the topic of coronavirus and vaping emphasised general concerns about vaping as a risk factor for serious COVID-19 infection (e.g., ‘If you smoke or vape, you may be more likely to get the coronavirus and to get very sick from it...’, or ‘#Smoking and #vaping weakens your lungs putting you at a much higher risk for serious complications from #COVID19’). A few tweets spoke specifically to the issue of teens and vaping, either highlighting risks (e.g., ‘Can Vaping Put Teenagers at Greater Risk of Getting Seriously Ill with Coronavirus?’) or the possibility of the pandemic as an opportunity for parents to have conversations about vaping (e.g., ‘Is the current #COVID19 pandemic a “reachable moment” where parents can help their children stop #vaping?’). Spanish speakers appeared to be less exposed to information and conversations about the coronavirus and vaping (especially around content aimed at teens). Spanish-language tweets were primarily focused on adults, often around smoking and vaping, and primarily included messages about how to quit. For example, several tweets suggested that ‘This is a good time to quit smoking and vaping. Your immune system will thank you’ [‘Este es un buen momento para dejar de fumar y vapear. Tu sistema inmunológico te lo agradecerá’]. Despite high interest in vaping and COVID-19, little content focused specifically on how parents can talk to teens about vaping.

Research Question 3: Misunderstandings and Misconceptions

We did not identify any specific misunderstandings or misconceptions on the topics of children and stress, e-learning, screen time, or vaping. However, Twitter data identified several key misunderstandings around coronavirus modelling. English-language tweets often expressed concerns about the politicisation of modelling, saying that ‘A power grab launched off flawed data’ and ‘Covid-19 is big money for some. The end goal is manipulation’. Spanish-language Twitter had much less critical related content. For

example, we found substantially more content in English around epidemiological models being over-exaggerated or unreliable.

Informing the Development of Relevant Content

Findings from the digital data scans were used in the selection of relevant research to inform the five news reports, the development of interview questions asked to scientific experts featured in each news report, and the development of specific content and/or messages in the news reports (Figure 10). For each topic, the team was first able to assess whether there was interest in it by looking at changes in searches over time. Secondly, once the topic was identified as of interest to parents, the team examined parents' concerns and misunderstandings to tailor the content of the news reports, searching for relevant research and researchers who could address these concerns and provide research-based strategies for parents. This process included searching for research articles and researchers to interview and identifying questions for experts featured in the reports. Full-length researcher interviews (between 10–15 minutes) were posted online and made available through social media and the Abriendo Puertas/Opening Doors programme for Latino parents. Snippets of the researcher interviews were incorporated into the five 90-second local TV news segments. All reports were also produced in Spanish. The TV segments were syndicated out to local TV stations throughout the country and Nielsen Research data found that these reports garnered 90 million views on average, triple the average views of the pre-pandemic CTNS reports that covered other child development topics.

Discussion

In this pilot study, we found that digital media data provide valuable, organic insights into concerns parents have been facing during the pandemic. Table 4 summarises the main findings of this study. We found that parental interest in the selected topics grew considerably during the start of the pandemic, confirming preliminary qualitative findings of Facebook scans. Parents' attention to the topics was crucial in informing the rapid development of the news reports by providing the team with valuable information to estimate audience interests and potential reach of the reports. We found a significant amount of information on the specific topics that parents shared online, which provided important insights into the development of the news reports. For instance, parents were particularly concerned about how to talk to their children about the dangers of COVID-19 while managing stress, sharing that there were very few solutions offered and minimal information provided. The team used this information to create a video emphasising research-based suggestions to manage child stress during the pandemic that was widely viewed. Similarly, parents questioned the use of models to estimate the effects of the

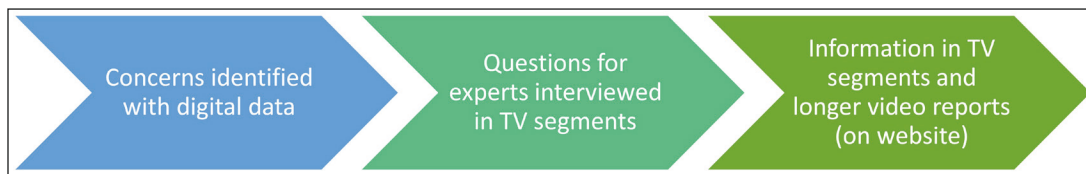


Figure 10. Use of Digital Media Data to Inform Child Trends News Stories

Source: The authors.

Table 4. Summary of Findings

Topic	Do Parents Show Interest in the Selected Topics Before They Are Featured in the News Reports?	What Concerns Do Parents Share and What Information Do They Need?	Are There Misunderstandings About the Five News Reports Topics?
Stress	Searches about stress in Spanish peaked twice, in late March and again in May. English-language interest in COVID-19 was highest in April.	Twitter conversation was remarkably similar in English and Spanish. It focused on the stress that COVID-19 and lockdowns are putting on children.	Need for more information about how to mitigate stress in children.
E-learning	Increased during February and March for both English- and Spanish-speaking parents.	Parents expressed concerns about academic quality of e-learning and barriers to wireless connectivity.	None.
Screen time	Interest started to increase in February and remained consistently high through April among English-speaking parents. The search volume for Spanish search terms was too low to report throughout the entire study period.	English language conversation focused on the risks of screen time to children or the relaxation of rules around screen time due to the pandemic. Both Spanish- and English-language Twitter results included official recommendations on making screen time more educational.	None.
Modelling	Search interest peaked in mid-April for English-language searches; Spanish-language searches showed fewer clear patterns.	Ongoing concern about model accuracy and why predictions were changing.	Some discussions around model accuracy, which may have contributed to misinformation.
Vaping	English-language vaping searches peaked in mid-March. There were too few Spanish-language searches for vaping to report.	Twitter conversation on vaping and teens was fairly minimal, although conversations about vaping and COVID-19 emphasised that vaping increases the risk of serious illness due to COVID-19.	Little discussion around how parents can talk with their teens about coronavirus and vaping.

Source: The authors.

pandemic, which helped the editorial team develop interview questions for researchers featured on the news reports.

We also found that the results varied depending on the topic and audience. For example, when sharing concerns about online learning, Spanish-speaking parents were concerned about motivation and quality, similarly to English-speaking parents, but also about the workload assigned to their children. We found some cases where parents shared misinformation, although this was dependent on the topic. We found some misconceptions about epidemiological models and their role in the pandemic, but the data collected did not find misinformation around vaping. Out of the five topics studied, we did not find enough searches in Spanish about vaping, which provides some evidence that this approach might not work for topics that are less salient or do not generate enough search traffic in languages other than English.

This study is not without limitations. We decided to focus on a few topics that were receiving a significant amount of attention in traditional and social media at the beginning of the pandemic, hence our findings might not necessarily extrapolate to other topics that were less salient at that time. Additionally, while Google Trends and Twitter provide a good proxy for levels of interest in a topic, they do not specify the searcher, making this an imperfect measure of parents' concerns. However, given that the selected topics were related to parenting practices (e.g., child stress), we can expect that a large percentage of the data mirrors parents' concerns. Also, piloting the use of digital media data to develop news stories that respond to parents' real-time concerns did not allow us to develop qualitative analysis protocols in advance. Instead, we had to rely on a rather simple thematic analysis of content, terms, and ideas. Qualitative analysis protocols may provide additional insights into Twitter data but was out of the scope of this project. Finally, the data may not be representative of all parents for at least two reasons; research has suggested that lower-income families and certain ethnic backgrounds are less likely to use social media and have access to the internet (Pew Research Center, 2016), and we limited the search to 500 tweets per day and a total of 22 Facebook groups.

The producers of the CTNS used the findings from the digital media data scans to inform the interviews with child development and scientific experts and families. Some of the findings were also featured in the resulting 90-second TV news reports. By accessing real-time digital media posts, the news producers were able to ask relevant questions and respond to the public's concerns in their reporting. The news reports were then syndicated out to local TV news stations throughout the United States.

The innovative development of this content very likely met the informational needs of low-income parents during the COVID-19 pandemic. Nielsen Research tracking data found that the produced news reports garnered 90 million views on average, triple the average views of pre-pandemic CTNS news reports. While we cannot attribute the increased viewership directly to the addition of digital media data scans, improving the relevance and alignment of news reports with audiences' needs were a successful and effective science communication effort that advanced the overall goals of the CTNS project.

Conclusion

The CTNS features rigorous research-based strategies and recommendations for parents through monthly TV news reports in English and Spanish. The results from this study highlight the benefits of using data from Twitter, Google Trends, and Facebook to inform the editorial process of the CTNS project during the onset of the pandemic. We find that this approach can supplement traditional ways of conducting audience research by gathering real-time data on what parents share on social media and the information they seek through online searches. This information allowed the CTNS team to develop science-based messaging through news reports that addressed emerging parenting concerns.

This pilot approach specifically dealt with child development and public health research. Researchers across many fields may find that this approach to audience research enhances more traditional forms of understanding specific groups of people and public opinion. The CTNS project used the analyses of the digital media scans to incorporate audiences' perspective into the production of relevant TV news reports on the rapidly changing and novel phenomenon of the global pandemic. However, this approach to audience research could inform many other types of projects, from science communication more broadly to research projects across the fields of science, technology, engineering, and math. Digital media scans could also enhance and complement traditional in-person methods of audience research, such as focus groups and surveys, offering several key advantages including organic insights into audiences' concerns, real-time data, and low-cost data collection. When serving multiple audiences, the possibility of conducting the searches in multiple languages offers a keen insight into the nuances of producing culturally-responsive products for populations dominant in other languages. Science journalism and science communication, as well as traditional research fields, may want to explore a more systematic way of incorporating audiences' concerns and values into their programmes and research.

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Notes

1. More information about the CTNS can be found at <https://positiveparentingnews.org/>
2. <https://medium.com/google-news-lab/what-is-google-trends-data-and-what-does-it-mean-b48f07342ee8>
3. The Google Trends API only provides relative search volume, not absolute search volume.
4. 'Indian Country' refers to Native American communities throughout the United States.

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