

Original Paper

A model of trust in online COVID-19 information and advice: cross sectional questionnaire study

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Background: During the COVID-19 pandemic many people sought information from websites and social media and understanding the extent to which these sources were trusted is important in relation to health communication.

Objective: This study aims to identify the key factors influencing UK citizens' trust and intention to act on advice about COVID-19 found via digital resources and to test whether an existing model of trust in ehealth provided a good fit for COVID-19-related information seeking online. We also wished to identify any differences between the evaluation of general information and information relating specifically to COVID-19 vaccines.

Methods: 525 people completed an online survey in January 2022 encompassing a general Web trust questionnaire, measures of information corroboration, coping perceptions, and intention to act. Data were analyzed using Principal Component Analysis (PCA) and structural equation modeling (SEM). The evaluation responses of general information and COVID-19 vaccines information were also compared.

Results: The PCA revealed 5 trust factors (1) credibility and impartiality (2) familiarity (3) privacy (4) usability and (5) personal experiences. In the final SEM model, trust had a significant direct effect on intention to act ($\beta=.65$; $P<.001$), and of the trust factors, credibility and impartiality had a significant positive direct effect on trust ($\beta=.82$; $P<.001$). People searching for vaccination information felt less at risk, less anxious and more optimistic after reading the information. We noted that most people sought information from 'official' sources. Finally, in the context of COVID-19, 'credibility and

impartiality' remains a key predictor of trust in ehealth resources but in comparison with previous models of trust in online health information, checking and corroborating information did not form a significant part of trust evaluations.

Conclusions: In times of uncertainty when faced with a global emergent health concern people placed their trust in familiar websites and relied on the perceived credibility and impartiality of those digital sources above other trust factors.

Introduction

The COVID-19 pandemic understandably led to an increase in 'official' sources of information and advice from politicians, public health officials, clinicians and scientists. This public facing information was communicated via the mainstream press, through live streamed press briefings and online. However, 'unofficial' sources of information were also circulated, primarily via social media. For individuals, access to good quality information during the pandemic was critical, not least because official messaging was constantly being updated in relation to recommended or mandated behaviors such as social distancing, mask wearing and self-isolation.

During this time, many people sought their information online [1] through websites, social media and mobile apps. People looked for information on the signs and symptoms of the virus, measures to avoid catching and spreading the virus, self-care once infected and vaccination information. In addition to health advice, people also sought related information on rules and guidance regarding self-isolating, masks and social distancing.

Accurate and appropriate health communication is an important tool in tackling any pandemic and it can directly influence individuals' affective and behavioral responses to a crisis [2]. In relation to the COVID-19 pandemic, studies have shown that access to a larger and more diverse set of information sources led to increased worry [3, 1] and also greater confusion, in part because of the infodemic of misinformation and rumours that were promoted around the pandemic [4]. The UK Government's approach to tackling COVID-19 relied upon broad public trust, but issues with inconsistent and unclear messaging as well as general political mistrust were apparent [5]. In short, it sometimes became difficult for people to know who to trust in relation to taking appropriate actions in order to reduce the spread of COVID-19 and minimize personal risk.

Against this backdrop, the aim of this study was to understand more about the digital resources people in the UK used for COVID-19-related information and the extent to which they trusted these resources. Whilst we know that online health formed a key source of information for many people during the pandemic, we do not know how people evaluated these digital sources and what factors were important in trusting the information, the source and ultimately deciding whether or not to act on the advice given. We also wished to test whether an existing model of trust in ehealth provided a good fit for COVID-19-related information seeking online. We begin by briefly reviewing the literature on trust and ehealth before introducing the COVID-19 context and outlining the study objectives.

Trust in online health information

Over the last 20 years, research has consistently pointed to the importance of both the design and the content of websites in terms of establishing trustworthiness [6, 7]. Commonly reported indicators of trust and credibility include site owners or sponsors; consensus among multiple sources; characteristics of writing and language; advertisements; content authorship; and interface design [8]. Related studies have looked at the quality of web-based health information have highlighted navigability, aesthetics and

ease of understanding as important factors [9]. As digital resources for health have developed and diversified, we have seen a move away from government and medically driven sources towards more charity and patient led sites [10] and the use of social media [11, 12] meaning that shared patient experience has also become a critical factor in determining trust and appropriateness of online advice [13].

Despite concerns around the quality and reliability of some digital sources [14], they are often well used and well liked. Interestingly, they are not necessarily trusted and the advice they contain is not always acted upon. In part, this may relate to a dislike in the UK for commercial funding models underpinning health websites [10]. A recent model of trust in ehealth [15] found that credibility and impartiality are the key predictors of trust in ehealth website and noted that websites containing patients' experiences can have a positive impact on trust but only if those sources have been checked against other sources first. The authors also noted that the need to corroborate digital information sources may be reduced in cases where there is strong familiarity with a well-used website.

COVID-19 context

The COVID-19 pandemic led to a global surge in information seeking online in relation to the spread of the virus, best means of protection, access to healthcare, local rules and guidance and, subsequently, information about COVID-19 vaccines, tracing apps and COVID-19 passports [16]. While official sources moved quickly to try and fill these information gaps, social media platforms provided a space for information and misinformation to circulate widely [17]. Conspiracy theories and rumours in relation to the virus and the vaccine were prevalent online as was poor quality information [18, 19, 20]. The unique situation increased attention on governments as a source of information however historically government and official health sources have been subject to mistrust and their health messages resisted especially concerning vaccinations for example in the case of the MMR vaccination and the H1N1 vaccination programme [21, 22]. In these cases, trust in non-official information sources and the media is often higher.

UK Context

In response to the global pandemic, the UK prime minister announced a national lockdown on March 23rd, 2020 [23]. Daily press briefings followed, led by politicians and National Health Service (NHS) leaders providing coordinated information on COVID-19 legislation and guidance, health advice and subsequently the vaccine rollout.

Survey data indicates there was a slight increase in political trust in the UK as lockdown commenced [24] and most people supported the government enforcement of behavior in the early months [5] with positive views on government decision-making related to response transparency. Although people looked to government and health leaders for information and guidance these officials were not immune from criticism. Politicians and advisors often found themselves at the centre of news stories that challenged perceptions of trust, [24] and of privacy and security, for example in relation to the roll out of contact tracing apps [25] and COVID-19 passports. Low trust in scientists and medics was also associated with COVID-19 vaccine hesitancy [26].

The sudden onset of COVID-19 and its impact not just on UK citizens but worldwide highlighted the public's need for information. Understanding how individuals sought information from digital sources and whether they trusted this information is the focus of this study. Note that this distinct aim is different from many of the studies of information seeking behavior during the pandemic that were more focused on the motives that drive online interrogation. Typically, these searches adopted the Risk Information Seeking and Processing (RISP) model [27] which sees risk information seeking as driven by factors such as information insufficiency, subjective norms and relevant channel beliefs. Whilst RISP has been used effectively to model information seeking behaviors in relation to COVID-19 [28,29] it says relatively little about the extent to which people decide whether to trust the information they are exposed to.

Other studies have examined overall levels of trust in traditional information sources concerning COVID-19 by comparing television, radio and newspapers with websites [30] but to our knowledge this is the first study that examines trust and the antecedents of trust in different digital resources in relation to COVID-19. Focusing on the antecedents of trust at this time alongside individuals' behavioral and attitudinal responses to the information they found is key for our future understanding of trusted health communication during health emergencies.

Rationale for current study

The revised model of trust in ehealth [15] indicates a number of antecedents for trust in online health information and advice and for intention to act on that advice. This study builds upon that work by asking whether existing trust models are a good fit for COVID-19 information seeking online. The uncertainty provided by the COVID-19 pandemic provides a unique opportunity to examine how people search for, evaluate and make trust decisions about health information and advice.

The COVID-19 pandemic provides an opportunity to examine in more depth the type of health information seeking that has been taking place. As described previously, people's information needs varied and including information on symptoms and symptom management, self-isolation and vaccination. Vaccination in particular presents a unique opportunity to explore health information seeking within the context of heightened uncertainty and self-reported behavioral outcomes.

It may be that the global nature of the pandemic and people's desire for information exchange fueled social media sources of health information and increased visibility of patient experiences. On the other hand, information corroboration is effortful and in times of heightened stress and uncertainty it may not be appropriate or lead to better coping outcomes. Relying on a single source of information may be more straightforward but trust in government or health professionals may impact trust perceptions around such information sources.

Therefore, the study has the following three aims:

- To examine whether an existing trust model is a good fit for COVID-19 related information seeking online.
- To examine differences in affective responses to digital resources about COVID-19 vaccination vs. general information about COVID-19.

- To examine whether searching had a self-reported impact on vaccination decisions or attitude towards COVID-19 passports.

Methods

Design

A cross-sectional survey was conducted in January 2022. At this time in the UK the Omicron variant wave had just peaked, mask use was still advised but no longer compulsory in indoor settings and self-isolation after a positive test result was still a legal requirement. We collected quantitative data from ehealth users regarding their use of health websites in relation to COVID-19. We used Prolific to recruit a representative UK sample.

Participants

A total of 600 people completed the survey. 525 participants indicated they had looked for COVID-19 information online. Of these 454 (85.5%) had looked for more general information and advice about COVID-19 while 77 (14.5%) had looked for information specifically on the vaccine. Participants received £1.25 (\$1.66, €1.49) for taking part in the study and the average completion time was around 7 minutes. Full details of participant demographics can be found in Table 1.

Table 1: Participant demographics (of those who reported looking for COVID-19 information, $N=531$)

		N	%
Age	18-25	55	10.4
	26-34	86	16.2
	35-54	199	37.5
	55-64	123	23.2
	65+	67	12.6
	Prefer not to say	1	0.2
Gender	Male	251	47.3
	Female	277	52.2
	Transgender	2	0.4
	Other	1	0.2
	Prefer not to say	0	0
Country	UK	525	100
Ethnicity	Caucasian	431	81.2
	Latino/Hispanic	3	0.6
	Middle Eastern	5	0.9
	African	12	2.3
	Caribbean	11	2.1
	South Asian	31	5.8
	East Asian	11	2.1

	Mixed	12	2.3
	Other	8	1.5
	Prefer not to say	7	1.3
Education Level	Less than Secondary school	2	0.4
	Secondary School	74	13.9
	Further education (E.g., College, A-level)	175	33
	Bachelor's degree	194	36.5
	Postgraduate degree (E.g., MSc, Phd, MD)	83	15.6
	Prefer not to say	3	0.6
Employment	Full time	256	48.2
	Part time	87	16.4
	Retired	86	16.2
	Unemployed	61	11.5
	Student	30	5.6
	Prefer not to say	11	2.1
Relationship Status	Single	145	27.3
	Married/Civil Partnership/Cohabiting	337	63.5
	Divorced	30	5.6
	Widowed	10	1.9
	Prefer not to say	9	1.7

The study received full ethical approval from [Blank for review]. The survey was hosted on Qualtrics. The first page provided participants with information detailing the aim, length, data storage, contact details, and withdrawal process of study. They were then asked to provide informed consent. Participants were asked whether they had gone online to look for health advice and information about COVID-19. Those answering “yes” were asked to indicate whether they had been searching for general health advice about COVID-19 or whether they had been searching for health advice about COVID-19 vaccinations. Participants then completed a series of questions relating to the last time they searched for health advice about COVID-19 online. Specifically, they were asked to “think about any one digital source that you visited during that search” and to answer the remaining questions with respect to that source. They answered questions relating to the impact of health advice on their coping perceptions and intention to act on the advice, the degree to which they trusted the information and the digital source, their attitude towards covid passports e.g. the NHS app that shows proof of vaccination and demographic information.

Measures

Unless stated otherwise, participants answered the following measures on a 5-point Likert scale (1=strongly disagree to 5=strongly agree).

General Web Trust Questionnaire

The general web trust questionnaire contained the 36 items from the study by Sillence et al., [15] alongside measures of coping, information corroboration and affective responses also taken from Sillence et al., [15]. Specifically, coping was measured by asking participants to respond to the following stem and variables “After I read the information about COVID-19 I felt...” (1) in control and (2) optimistic

using a 5-point scale with the labels: 1=less, 2=slightly less, 3=no different, 4=slightly more, and 5=more (Cronbach alpha=.84.). Additional affective responses, worried, reassured, at risk, confused and anxious were measured using the same format.

Information corroboration with other sources of information was measured with the following 4 items: (1) "I checked other websites" and (2) "I checked other sources" (3) I found the advice consistent across other website/apps (4) I found the advice consistent across other sources (Cronbach alpha=.87).

Impact on vaccination decision was measured using a single item developed for this study: "To what extent did the information and advice you read online impact your decision regarding COVID vaccinations? Responses were given on 5-point scale from "1=It did not influence at all to 5=it influenced to a very large degree.

Attitude towards COVID-19 passports was measured using a single item developed for this study: "I think Covid passports are a good idea" (1=strongly disagree to 5=strongly agree).

Outcome Measures

Trust was measured following Sillence et al., [15] using the mean response to the following 2 items: (1) "I trusted the site" and (2) "I felt I could trust the information on the site" (Cronbach alpha=.95).

Intention to act was an outcome measure, assessed with 1 item "I intended to act upon the advice." This item was taken from Sillence et al., [15].

Results

We first explored the general Web trust questionnaire by performing principal component analysis (PCA). We then explored the relationship between the factor structure and outcomes by testing its fit to the sampled data using structural equation modeling (SEM).

Properties of the General Web Trust Questionnaire

The 36 items of the scale were entered into the PCA. All items loaded onto the extracted components but any items with factor loadings lower than 0.30 were suppressed (Table 2). The analysis indicated that five components possessed Eigenvalues greater than 1 and together explained 68.7% of the variance in keeping with accepted conventions for successful PCA [31]. The Familiarity factor is the weakest of those extracted although it does meet the minimum threshold of comprising three items [32].

Table 2: Factor loadings for each item (factor loadings lower than .30 are suppressed)

		Rotation Factor Loadings				
Item	Personal experience (PEx)	Credibility & Impartiality	Useability	Privacy	Familiarity	

The language made it easy to understand			.694		
It helped me understand the issue better			.696		
It was easy to use			.773		
It told me most of what I needed to know			.589		
The layout was consistent with other digital sources			.605		
The advice appeared to be prepared by an expert		.694			
The advice seemed to be offered in my best interests		.734			
The advice came from a knowledgeable source		.729			
The advice seemed credible		.802			
It was owned by a well-known organization					.725
It featured familiar logos					.775
It had a professional design					.640
It had an attractive design			.470		
It provided reassurances about my privacy				.659	
It gave the option to post anonymously				.446	
It gave reassurances about how they used your information				.781	
It had a privacy policy				.821	
It explained their use of cookies				.751	
It contained accounts of other people's experiences	.870				
There was a chance to share my experiences	.895				
There were opportunities to interact with other people on the digital source	.867				
I saw a wide range of experiences rather different to mine	.877				

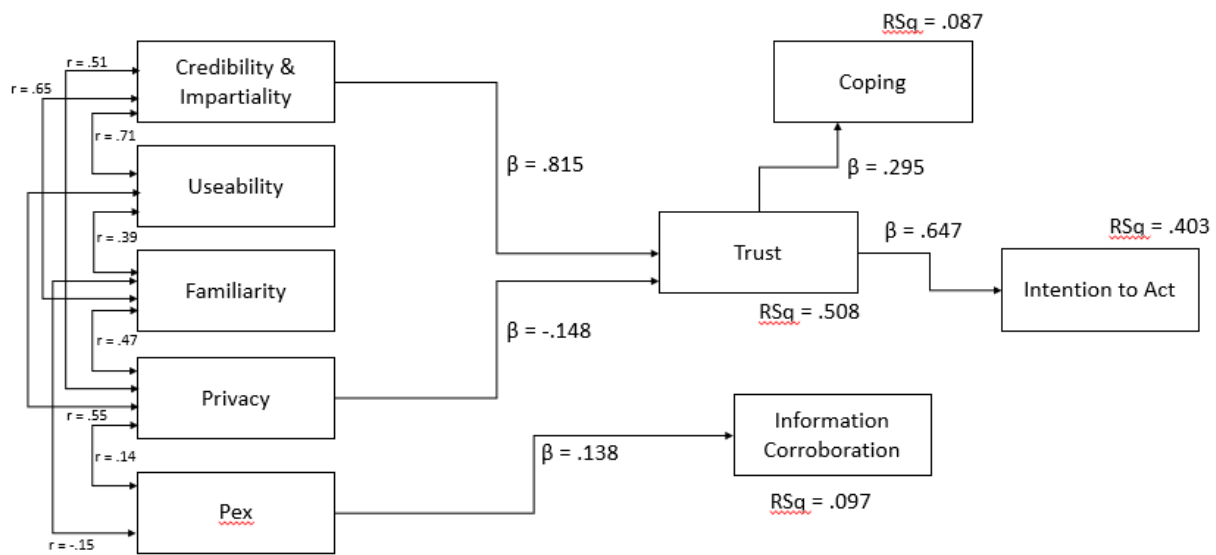
It offered powerful accounts of health experiences	.853				
It felt like the advice was tailored to me personally	.617				
I was offered the chance to see experiences from people just like me	.913				
It contained contributions from likeminded people	.918				
I was able to contribute to content on the digital source	.883				
The personal accounts on the digital source were written by people similar to me	.909				
I found personal accounts that reflected my own experience	.920				
I found personal accounts that were relevant to my condition	.927				
There were opportunities to gather information from the personal accounts on the digital source	.909				
The personal accounts contained advice for readers	.905				
The personal accounts provided social or emotional support	.891				
The advice appeared to be impartial and independent		.783			
The advice seemed objective (i.e. no hidden agenda)		.805			
It was free from advertisements		.536			
Eigen values	11.8	4.7	3.2	3.0	2.1
Variance Explained (%)	32.7	13.1	8.9	8.2	5.8

Exploring the relationship between the trust questionnaire and self-reported behavioral outcomes

The data were further analyzed using structural equation modelling (SEM) performed in AMOS employing the maximum likelihood estimation method on the item covariance matrix. The specified model was based on Sillence et al., [15] and modified to incorporate the new five factor structure.

Goodness of fit indices support the specified model. The Chi squared value indicated poor fit $\chi^2 (773) = 1265.510, P < .001$. However, this test is considered too sensitive for samples over 200 and here the sample size is 448. The Cmin/df value of 1.637 indicates good fit. The Goodness of Fit (GFI) and Adjusted Goodness of Fit (AGFI) values of .887 and .862 respectively indicate adequate fit [33]. The Comparative Fit Index value of .970 indicates good fit [34]) as does the Root Mean Square of Approximation (RMSEA) value of .038, 90% CI [.034, .041] [35].

Figure 1. The trust model with significant standardised path coefficients



The model accounted for 64.7% of the variance in Trust, 8.7% in Coping, 9.7% in Information Corroboration and 40.3% in Intention to Act. All beta path coefficients including those in Figure 1 and those that were not significant were inspected in evaluating the predictive power of the model and are presented for completeness in Table 3.

Table 3. The unstandardized path weights and critical ratio (ie Z-score) values for the main effects of the hypothesised full model in figure 1.

<i>Parameter</i>	<i>Unstandardised path coefficient</i>	<i>Critical Ratio (CR)</i>	<i>P- value</i>
<i>Credibility and Impartiality – Trust</i>	.932	9.789	<.001
<i>Credibility and Impartiality – Information Corroboration</i>	.167	1.066	.286
<i>Useability - Trust</i>	-.049	-.356	.722
<i>Useability – Information Corroboration</i>	.391	1.560	.119

<i>Familiarity - Trust</i>	<i>-.042</i>	<i>-.643</i>	<i>.520</i>
<i>Familiarity - Coping</i>			
<i>Familiarity - Information Corroboration</i>	<i>.117</i>	<i>.980</i>	<i>.327</i>
<i>Privacy - Trust</i>	<i>-.187</i>	<i>-2.431</i>	<i>.015</i>
<i>Privacy – Information Corroboration</i>	<i>.057</i>	<i>.414</i>	<i>.679</i>
<i>PEX - Trust</i>	<i>-.001</i>	<i>-.025</i>	<i>.980</i>
<i>PEX – Information Corroboration</i>	<i>.090</i>	<i>2.775</i>	<i>.006</i>
<i>Trust - Coping</i>	<i>.272</i>	<i>4.894</i>	<i><.001</i>
<i>Trust – Intention to Act</i>	<i>.795</i>	<i>15.231</i>	<i><.001</i>
<i>Coping – Intention to Act</i>	<i>-.041</i>	<i>-.669</i>	<i>.503</i>
<i>Information Corroboration – Trust</i>	<i>.001</i>	<i>.025</i>	<i>.980</i>
<i>Information Corroboration – Intention to Act</i>	<i>-.020</i>	<i>-.609</i>	<i>.543</i>

Only Credibility and Impartiality was found to possess a significant positive path to Trust. Privacy had a weaker yet significant negative path meaning privacy assurances were associated with lower trust. Familiarity, Useability and Personal Experience (PEX) were not significantly predictive of Trust. Only Trust was found to significantly predict intention to act on the advice. In addition, Trust significantly predicted Coping suggesting that trustworthy websites heighten individuals’ coping perceptions, making them feel more in control and optimistic. Personal experience (PEX) significantly predicts Information Corroboration suggesting that people are exploring a little further than the original digital source however this corroboration process does not appear to be affecting their level of trust or intention to act.

Comparison of two populations

Although the relatively small sample size for the vaccine information group meant that a comparable SEM model could not be reliably tested a series of independent samples t-tests were employed to compare the two groups on the key variables of interest (Tables 4 & 5).

Independent Samples t-tests

Table 4. Mean (SD) values

Group	Trust	Intention to Act	Corroboration	Impact on decision regarding vaccination	Attitude towards COVID-19 passports
Searching for info on vaccinations (N = 77)	4.22 (.91)	4.10 (1.05)	3.49 (1.24)	2.90 (1.21)	3.38 (1.51)

Searching for information on COVID-19 (N = 454)	4.33 (.74)	4.13 (.89)	3.49 (1.06)	2.74 (1.39)	3.51 (1.36)
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There was no significant difference between groups for *Trust* $t(523) = -1.169, P = .243$, Cohen's $d = -.144$, 95% CI [-.386, .098], *Intention to Act* $t(523) = -.187, P = .851$, Cohen's $d = -.023$, 95% CI [-.265, .219], or *Corroboration* $t(523) = -.038, P = .969$, Cohen's $d = -.005$, 95% CI [-.247, .237], *Impact on decision regarding vaccination* $t(523) = .934, P = .351$, Cohen's $d = .115$, 95% CI [-.127, .357], or *COVID-19 passports* $t(523) = -.773, P = .440$, Cohen's $d = -.095$, 95% CI [-.337, .146].

Table 5. Mean (SD) values for 'after I read the information' variables

	Worried	Reassured	At risk	Confused	Anxious	Optimistic	In control
Group							
Searching for info on vaccinations (N = 77)	2.27 (1.11)	3.84 (.95)	2.40 (.98)	2.14 (1.13)	2.42 (1.20)	3.66 (1.11)	3.57 (1.13)
Searching for information on COVID-19 (N = 454)	2.48 (.88)	3.68 (.77)	2.84 (.88)	2.15 (.98)	2.76 (.97)	3.27 (.81)	3.42 (.85)

Those searching information on vaccinations ($M = 2.40$) felt significantly less *At Risk* than those searching for general information on COVID-19 ($M = 2.84$), $t(523) = 3.988, P < .001$, Cohen's $d = -.492$, 95% CI [-.735, -.2348], and felt significantly less *Anxious* ($M = 2.42$) than those searching for general information on COVID-19 ($M = 2.76$), $t(523) = -2.758, P = .003$, Cohen's $d = -.340$, 95% CI [-.583, -.097]. Those searching information on vaccinations ($M = 3.66$) felt significantly more *Optimistic* than those searching for general information on COVID-19 ($M = 3.27$), $t(523) = 3.760, P < .001$, Cohen's $d = .464$, 95% CI [.220, .707].

There was no significant difference for the variable *In Control*, $t(523) = 1.335, P = .182$, Cohen's $d = -.165$, 95% CI [-.077, .407] or for *Confused*, $t(523) = -.054, P = .957$, Cohen's $d = -.007$, 95% CI [-.248, .235]. Finally, the variables *Worried* and *Reassured* approached but did not reach statistical significance $t(523) = -1.813, P = .07$, Cohen's $d = -.224$, 95% CI [-.466, .019] and $t(523) = 1.712, P = .087$, Cohen's $d = .211$, 95% CI [-.031, .453] respectively.

Digital sources of information

Table 6 shows the digital sources used. The majority of participants used either the NHS healthcare sources or the governmental sources for both general information and for vaccine specific information.

Digital sources were categorised as follows:

Governmental sources: Official UK government website (Gov.uk), World Health Organisation, Office of National Statistics and Centre for Disease Control.

NHS healthcare sources: Any page hosted on the NHS website (nhs.uk).

Other healthcare sources: Any non-NHS healthcare website. This included: The Mayo Clinic, WebMD, patient.co.uk, healthcheck podcast.

News websites: Any of the mainstream news providers, the majority of those reported were the BBC.

Search engines: Where participants did not go to one source but reported explicitly using search engines, such as google, to intentionally search for COVID related information. Rather than for example visiting a particular source (perhaps a source perceived as authoritative or trusted), such as the NHS, government or BBC websites, and browsing the content from there.

Scientific Journal: Any peer-reviewed journals publishing academic research.

Specific Health Condition Websites: Any website dedicated to a specified health condition rather than a general health website, this included asthma.org and Crohn's & Colitis UK.

Social Media & Forums: Any online forum or social networking platform defined as user-driven and facilitating sharing of content, dialogue creation, and communication by and between users (in keeping with Kapoor et al, 2018 [36]).

Other: All instances where resources were not explicitly specified or where participants reported visiting multiple sources.

All other resources are named individually in Table 6.

Table 6: Digital sources used Source	General Info (N=454)		Vaccine Specific Info (N=77)	
	N	%	N	%
NHS healthcare sources	268	59.03	39	50.65
Governmental sources	64	11.74	11	14.29
Multiple Resources / unspecific	37	8.15	13	16.88
News websites	30	6.61	3	3.90
Other healthcare sources	6	1.32	1	1.30
Social Media & Forums	20	4.41	2	2.60
Search Engines	19	4.19	7	9.09
Zoe COVID-19 Study	6	1.32	0	-
Scientific Journals	1	0.22	0	-
Specific health condition websites	2	0.44	0	-
Wikipedia	1	0.22	0	-
TripAdvisor	0	-	1	1.30

Discussion

Principal Results

Trust continues to significantly influence self-reported intention to act on health information. In terms of trust predictors, only credibility & impartiality has a significant, direct and positive relationship with trust. Privacy has a significant negative relationship with trust. Other predictors (familiarity, usability, and personal experiences) may be indirect and mediated through other trust variables. The variable Personal Experiences had a significant direct effect on information corroboration and trust was found to significantly relate to coping perceptions. The findings suggest a number of important discussion points.

First, the Sillence et al., [15] trust model provides a reasonable fit for COVID-19 related health information online. Trust continues to predict intention and the credibility and impartiality of the digital source remains the strongest predictor of trust in digital health sources. However, compared to the 2019 model, the picture here is of a simpler trust process in which the credibility and impartiality factor does the 'heavy lifting' in relation to trust compared to the other variables. Another key difference is the lack of relationship between corroboration and trust. In earlier models, health information seekers looked to verify the information they found online by cross checking with other digital and non-digital sources. Here we see only a direct relationship between the credibility and impartiality of the website and trust. One reason for this, given the predominance of the NHS as the most popular site for information and advice, is that our health information seekers are simply taking the website at face value providing it appears sufficiently credible and impartial. However, it is interesting that in an American sample, information seekers relied heavily upon often unreliable social media sources for information and advice, yet still engaged in relatively low levels of fact-checking [37] and so we must consider the possibility that people are being bombarded with so much information in relation to the pandemic that they simply switch off.

The role of personal experiences within digital sources is interesting here. While personal experience significantly predicts information corroboration there was no subsequent relationship with trust. In the 2019 model [15] it was suggested that patient experiences can positively influence trust but only if users first corroborate the information through other sources. In our study we suggest that people are checking up on these patient stories and experiences simply out of interest rather than as a way of assessing the trustworthiness of the information. When faced with a high degree of uncertainty and with limited detailed information, assessments of risk may be emotion based [38] and people may well seek out other people's personal accounts of their COVID-19 experiences. Personal accounts are often engaging and are seen as more relatable than statistical information when it comes to decision-making [39]. While personal experiences are now embedded within a diverse range of digital resources, those more closely associated with personal content e.g., social media platforms or individual blogs, were generally underrepresented in the data we collected. Instead, we observed a reliance on official digital sources, in particular the NHS website and government sources. In terms of pandemic or emergency, reliance on official sources may be more commonplace. Sillence et al., [15] found that the majority of UK respondents cited the NHS website as their source of health information and McNeill, Harris & Briggs, [40]) noted that the main UK source to be retweeted during the H1N1 pandemic was NHS Choices. In our current study, there was little reported use of social media which is perhaps surprising and contrasts with other recent health pandemics in which social media use and misinformation has been prevalent [41, 42, 37] as well as in earlier studies examining the COVID-19 pandemic and the facilitation of conspiracy theories [43 44].

Despite generally high levels of mistrust in the government's overall handling of the pandemic [5], UK citizens still sought information from government sites. Moreover, we see a reliance on health professionals and public health information. In a time of limited information, there may be fewer options available to information seekers and individuals may be satisfied with seeking official sources of information even if they contain basic knowledge as opposed to more detailed, specific information. This contrasts with earlier work on trust in digital health information in which personalization or tailoring is seen as important to trust. People with long term experience of a particular health condition often become experts by experience and may seek more specific, tailored digital resources to support their health conditions. This involves making more fine-grained assessments of the personal relevance of the information before deciding to trust or act upon the advice it contains [45, 10] and is especially true where the condition is rare or less well known [46]. In the case of COVID-19, a worldwide pandemic affecting all age groups, it might be that generic information applicable to all sufficed in this case. There was little sense that people were checking COVID-19 information in relation to their other, pre-existing health conditions and specific health websites may not have had that information readily available. In the light of research that shows how health information overload may lead to increased anxiety [47], our participants' reliance on a relatively few, authoritative websites seems like a reasonable strategy. Too much, possibly conflicting, information about COVID-19 can leave an individual feeling overwhelmed and will ultimately lead to 'information avoidance', which is clearly a poor outcome in the face of a global pandemic.

Unlike Sillence et al.'s [15] 2019 model, we note that privacy has a weak negative relationship with trust. The topic of privacy was raised repeatedly in relation to the discussion of contact tracing apps and COVID-19 passports and so while not directly related to the digital source being used it may be that being asked to think about the privacy features of sources stimulates a wider consideration of privacy and mistrust. Rather than privacy policies etc. being seen as an example of good practice, the very fact that these options were present on digital sources may have served as a reminder that data are being collected, processed and often shared. Privacy nudges may well remind people of the need to be mindful of privacy but can also raise awareness of the data that is available for collection [48, 49].

Second, trust significantly predicted coping suggesting that trustworthy websites heighten individuals' coping perceptions, making them feel able to cope. Interestingly, Wang et al., [1] did not find an association between use of the internet as an information source on COVID-19 and self-confidence in coping with COVID-19 but did not focus on trusted websites.

Looking at the affective variables in more detail for the two groups (general information seeking and vaccination information) we see that those searching for vaccination information, felt more positive – specifically felt less at risk, less anxious and more optimistic after reading the information. Wang et al., [1] found that vaccination information sources have different effects on students' coping appraisal of COVID-19 with information from medical personnel leading to greater knowledge about the mechanism of vaccination and greater response efficacy of vaccination compared to information from coworkers or colleagues. In terms of coping, during the H1N1 pandemic, those people who adopted a more problem focused coping strategy including seeking out information to help solve problems were more likely to indicate they would be vaccinated [22]. In our data, those individuals who have gone looking for the information around vaccination feel better for having done so.

Zheng, Jiang & Rosenthal, [50] noted that vaccine information seeking is related to vaccination intention and suggest that health information seeking can be viewed as a coping behavior when people do not have sufficient knowledge of a particular health topic. Although seeking vaccine related information online was also positively related to perceived vaccine information overload [50] it may be that sticking with a single trusted source is preferable for improved coping. Finally, there were no differences in terms of trust, intention to act on information or attitude towards COVID-19 passports between participants who were searching for general COVID-19 health information versus those who had searched for vaccination information. This is unsurprising given the similarity of digital sources used.

In summary, people searching for general COVID-19 information as well as those searching for COVID-19 vaccine specific information sought out official sources of information online. In terms of uncertainty when faced with a global emergent health concern people placed their trust in familiar websites and relied on the perceived credibility and impartiality of those digital sources.

Limitations

It is important to note that data was purposely not collected during a period of national lockdown in the UK. The vaccination program was already well underway and COVID-19 passports were very much still on the agenda. People may have sought information from alternative digital sources had data collection taken place during a period of lockdown. Focusing on the UK made sense given the local regulations and practices in place, but it would be interesting to make comparisons with other countries going forward. The reliance on the NHS website in the UK would be interesting to compare with countries where different funding models exist for example where health insurance schemes mean there is no single free at the point of service system. Vaccine hesitancy is relatively low in the UK and has declined since the start of the vaccination roll out program from 10% to 3% in September 2021 [51]. Other countries, for example France, have much higher levels of vaccine hesitancy [52] and comparisons here in relation to trust around digital health resources would warrant further investigation. Finally, it is interesting to note that although we have used a one-shot cross-sectional methodology, we mirror findings from Zhang et al., [53] who examined trust over several waves earlier in the pandemic and noted a decrease in use of social media over time and an increase in trust in government information.

Conclusion

In conclusion, in the context of COVID-19, 'credibility and impartiality' remains a key predictor of trust in ehealth resources but in comparison with previous models of trust in online health information, checking and corroborating information did not form a significant part of trust evaluations. In times of uncertainty when faced with a global emergent health concern, people placed their trust in familiar websites and relied on the perceived credibility and impartiality of those digital sources.

Abbreviations

PCA: Principal Component Analysis

SEM: structural equation modeling

RMSEA: Root Mean Square of Approximation

AGFI: Adjusted Goodness of Fit

GFI: Goodness of Fit

PEX: Personal experience

NHS: National health Service

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