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Epistemic vigilance online: Textual inaccuracy and children's selective trust in webpages

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In this age of 'fake news', it is crucial that children are equipped with the skills to identify unreliable information online. Our study is the first to examine whether children are influenced by the presence of inaccuracies contained in webpages when deciding which sources to trust. Forty-eight 8- to 10-year-olds viewed three pairs of webpages, relating to the same topics, where one webpage per pair contained three obvious inaccuracies (factual, typographical, or exaggerations, according to condition). The paired webpages offered conflicting claims about two novel facts. We asked participants questions pertaining to the novel facts to assess whether they systematically selected answers from the accurate sources. Selective trust in the accurate webpage was found in the typos condition only. This study highlights the limitations of 8- to 10-year-olds in critically evaluating the accuracy of webpage content and indicates a potential focus for educational intervention.

Statement of contribution

What is already known on this subject?

- Children display early epistemic vigilance towards spoken testimony.
- They use speakers' past accuracy when deciding whom to trust regarding novel information.
- Little is known about children's selective trust towards web-based sources.

What does this study add?

- This study is the first to examine whether textual inaccuracy affects children's trust in webpages.
- Typos but not semantic errors led to reduced trust in a webpage compared to an accurate source.
- Children aged 8-10 years show limited evaluation of the accuracy of online content.

The Internet provides us with limitless information and opportunities for learning. However, it is becoming ever clearer that access to misinformation is an inevitable consequence of such an unregulated medium. The burden is therefore on individual users to be discerning about the quality of sources that they encounter online in order to minimize the risk of accepting false information (Brante & Strømsø, 2018). Although adults are not immune to these risks (Pennycook & Rand, 2018; Vosoughi, Roy, & Aral, 2018), children may be particularly vulnerable given their fledgling critical literacy skills

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(Flanagin & Metzger, 2008). It is now estimated that a third of Internet users across the world are under the age of 18 (UNICEF, 2017) and children are increasingly relying on the Internet for information-seeking purposes (Ofcom, 2018; Ólafsson, Livingstone & Haddon, 2014). The extent to which they engage in critical evaluation of online sources is therefore a pressing research question.

Previous research has established that the ability to demonstrate epistemic vigilance towards testimony in face-to-face communication emerges early and constrains children's learning from others (Sperber *et al.*, 2010). Numerous studies employing the 'selective trust' paradigm have shown that preschoolers, rather than being indiscriminate in their trust, apply a range of criteria (e.g., taking into account speakers' relative expertise, expressed confidence, or age) for differentiating between reliable and unreliable speakers (for reviews, see Harris, Koenig, Corriveau, & Jaswal, 2018; Mills, 2013). In particular, children display early monitoring of accuracy. For example, when presented with two informants who label familiar objects either correctly or incorrectly, preschoolers track the informants' accuracy spontaneously and prefer to seek and accept labels for novel objects from the informant who was correct rather than incorrect in the past (Birch, Vauthier, & Bloom, 2008; Corriveau & Harris, 2009; Koenig, Clement, & Harris, 2004). By age 4 years, children can discriminate between speakers based on the relative frequency of errors displayed (Pasquini, Corriveau, Koenig, & Harris, 2007) and by age 6–7 years, they are sensitive also to the severity of errors (Einav & Robinson, 2010). To date, the literature has largely focused on children's evaluation of spoken testimony; however, with the recent increase in Internet use among children, and subsequent risk of exposure to misinformation, it is important to extend research on selective trust to the digital domain.

One study suggests that early accuracy monitoring generalizes beyond human informants to technological informants: Danovitch and Alzahabi (2013) found that 3- to 5-year-olds selected information from a previously accurate computer over a previously inaccurate computer while answering questions about unfamiliar facts. However, in this study the computers presented images only, due to the participants' age. Therefore, it is an open question whether older children, who can read independently, would apply this evaluative strategy to realistic webpages containing text.

Currently, little is known about children's selective trust in text sources more generally. Research comparing young children's trust in text-based versus spoken labels has revealed a bias to believe the written information that begins once children acquire a basic reading ability (e.g., Einav, Rydland, Grøver, Robinson, & Harris, 2018; Robinson, Einav & Fox, 2013). Moreover, they are willing to accept implausible, printed information that conflicts with their expectations and which they reject when it is conveyed orally (Eyden, Robinson, Einav, & Jaswal, 2013). It is not yet known, however, whether this bias remains once children become more fluent readers nor whether children distinguish between two text-based sources on the basis of their relative accuracy.

In the current study, we examined whether children show reduced trust in webpages containing inaccuracies relative to accurate webpages. Although, to the best of our knowledge, this has not been directly tested, there is mounting evidence from the wider literature to suggest that critical evaluation of online sources is limited in childhood and that this is a global problem. Across Europe, only 56% of 25,000 Internet users aged 11–16 years reported comparing multiple websites to determine whether information was true (Sonck, Livingstone, Kuiper, & de Haan, 2011). Similarly, behavioural studies from a number of countries find that children in middle school and high school pay little attention to source information (e.g., author expertise or motivation) when considering online content (Kuiper, Volman & Terwel, 2008; Paul, Macedo-Rouet, Rouet, & Stadtler, 2017;

McGrew, Breakstone, Ortega, Smith, & Wineburg, 2018; Salmerón, Macedo-Rouet & Rouet, 2016; Walraven, Brand-Gruwel & Boshuizen, 2009; Zhang & Duke, 2011; but see Harrison, 2018), and find it hard to distinguish between real and fake news stories (National Literacy Trust, 2018). Importantly, these research findings are echoed by teachers' experiences in the classroom, indicating real impact on children's everyday learning (Miller & Bartlett, 2012).

Thus, children's documented epistemic vigilance towards *spoken* testimony appears to stand in sharp contrast to their limited epistemic vigilance *online.* Nonetheless, while past research suggests that children are failing to engage in 'sourcing' online (i.e., processing and evaluating information about the source; see Scharrer & Salmerón, 2016), we do not know to what extent they take a critical stance regarding the quality of the text content (i.e., what is written). Yet, both types of evaluation are key mechanisms for guarding against misinformation (Sperber *et al.*, 2010). Moreover, whereas online sources cannot easily be scrutinized for reliability using many of the cues that children consider when evaluating spoken testimony (particularly as in many cases, the link to a human source is not transparent), unambiguous inaccuracy in the text is more directly accessible.

Previous research on children's evaluation of Internet sources has largely been restricted to early and late teens. In contrast, we chose to focus on 8- to 10-year-olds given that at this age, the majority of children in the United Kingdom already rely on search engines for obtaining information and for school-related work (Ofcom, 2018). Moreover, it is around this time that they begin transitioning from adult-dependent to independent Internet use (Kidron & Rudkin, 2017) and therefore first face the challenge of identifying reliable information online without external guidance. For these reasons, we considered it a priority to extend the limited experimental evidence base regarding the online critical skills of this age group.

We adapted the selective trust paradigm to test whether children are influenced by the presence of inaccuracies contained in webpages when deciding from which sources to obtain novel information. We presented children with printed screenshots of three pairs of webpages about child-friendly topics. One webpage in each pair contained three obvious inaccuracies that were never referred to by the experimenter. The paired webpages offered conflicting claims about two facts piloted to be unfamiliar to children of this age. We asked children to use the webpages to answer factual questions related to the novel information to assess whether they systematically selected answers from the accurate webpage. This mirrored the standard selective trust task (e.g., Koenig *et al.*, 2004) where participants observe how accurate speakers are with respect to familiar information followed by a test phase where the speakers provide conflicting claims regarding novel information and participants are asked to endorse one of the claims. On completion of the current trust task, we asked children a series of post-test questions designed to examine the reasoning for their choice of answers, as well as their prompted awareness of the errors.

To explore children's responses to a range of different inaccuracies that may be encountered online, there were three error conditions: factual inaccuracies, exaggerations (both of which are types of semantic errors), and typographical errors. We did not set out to compare directly between these conditions in this study; however, previous work on comprehension monitoring, showing that children and college students are more likely to detect nonsense words than falsehoods in text spontaneously (Baker, 1984, 1985), suggested that we might find greater sensitivity to the typographical errors. In addition, while we expected that semantic errors should influence trust judgements given their relevance to source evaluation for factual accuracy, we held no firm prediction regarding the typos. Although these mistakes did not alter the factual accuracy of the text, children could view them as a sign of incompetence or carelessness that would undermine their trust in that source.

Method

Piloting and task development

We piloted the task with 8- to 10-year-olds to (1) check and improve the readability of the text for the final materials; (2) substitute any inaccurate information that children did not perceive as wrong when prompted; and (3) confirm that children did not spontaneously know the answers to the final test questions (i.e., the information was indeed novel to children of this age). We also ran the final version of the task on a small group of adults (n = 8) who performed at ceiling. (See Appendix S1 for further information.)

Participants

Forty-eight children took part in the study (M_{age} = 9 years 11 months (9;11), range = 8;9 – 10;9; 26 males, 22 females). Written consent was provided for all participants by parents, and assent was obtained from children. Participants attended suburban state primary schools in predominantly White British neighbourhoods that ranged in socio-economic status: the most deprived (19% sample), third most deprived (39% sample), and fourth least deprived (42% sample) deciles in England, according to the Government Index of Multiple Deprivation (IMD) score 2015. All participants were native English speakers or spoke English fluently. All were able to read the text independently, except for one child who was omitted from the original sample and replaced. The class teachers in the schools confirmed that children in participating classes had not received any direct lessons about evaluation of Internet sources, in line with practice in many primary schools in the United Kingdom (National Literacy Trust, 2018).

Materials

Webpages were printed in colour onto A4 paper so that children could have both sources in front of them when answering the test questions and thereby ensure there were no memory demands or order effects. (Several previous studies examining children's online sourcing skills have similarly used printouts of web-based materials, see, e.g., McGrew *et al.*, 2018; Paul *et al.*, 2017). We chose child-friendly familiar topics for the webpages: the North Pole, guitars, and seasons. For each topic, there were two different webpages that were educational in theme. We used real webpages to ensure the stimuli looked authentic but they were adapted for the experiment using the editing tool: X-Ray goggles by Mozilla (https://goggles.mozilla.org/). The paired webpages contained similar but not identical information about the topic to maintain realism and ensure they were perceived as independent sources. Two versions of text were created for each webpage, one containing accurate information and one containing three inaccuracies. Type of inaccuracies was varied across the topics; the North Pole passage included simple factual falsehoods (e.g., 'polar bears have thick stripy fur'), the seasons passage included exaggerations (e.g., 'It snows every day during winter'), and the guitars passage contained typos (e.g., 'familee'). See Appendix A for a full list of inaccuracies used in each condition. The accurate text included the corresponding correct information for these errors (i.e.,

Table 1. Counterbalancing design

Version	Webpage in/accuracy for each topic	Presentation order of in/accurate webpages across the 3 trials	Answer option provided by the accurate webpage in each topic
1a	Webpage 1 = A Webpage 2 = I	(1) AI, (2) IA, (3) AI	1
1b	Webpage 1 = A Webpage 2 = I	(1) IA, (2) AI, (3) IA	1
2a	Webpage 1 = A Webpage 2 = I	(1) AI, (2) IA, (3) AI	2
2b	Webpage 1 = A Webpage 2 = I	(1) IA, (2) AI, (3) IA	2
3a	Webpage 1 = I Webpage 2 = A	(1) AI, (2) IA, (3) AI	1
3b	Webpage 1 = I Webpage 2 = A	(1) IA, (2) AI, (3) IA	1
4a	Webpage 1 = I Webpage 2 = A	(1) AI, (2) IA, (3) AI	2
4b	Webpage 1 = I Webpage 2 = A	(1) IA, (2) AI, (3) IA	2

Note. A = accurate webpage; I = inaccurate webpage; the topics were presented in a randomized order.

'polar bears have thick white fur'; 'it sometimes snows during winter'; 'family'). Paired webpages also provided conflicting information concerning two novel facts, which were relevant to the two factual test questions children were asked about each topic. The two options were both plausible answers (e.g., the possible answers for 'What wood are guitars made of?' were 'ash' and 'spruce', both of which are commonly used in guitar manufacture). See Appendix B for a list of test questions and answer options. The novel information contained in the accurate and inaccurate passages was counterbalanced. Text in each of the webpages was brief (ranging from 96 words to 117 words).

The four versions of the stimuli (crossing accuracy of webpage and answer options) were counterbalanced across participants. For a summary of the counterbalancing design, see Table 1. For each topic, we created a question sheet that consisted of two test questions, each regarding one piece of novel information and spaces for children to write their answers.

Design and procedure

Participants completed the task individually in quiet areas near their classroom. The experimenter (E) introduced it generally as a project about how children learn from webpages. E then explained that she had gone online and did a search for the three topics, and printed off two of the webpages that came up for each topic to show them. She went on to say, 'I'd like you to read each one out loud and then I'll give you a short question sheet, and you can use the webpages to help you answer the questions'. Importantly, E never referred directly to the embedded inaccuracies. Participants were presented with the topics in a randomized order. For each topic, they were given one webpage to read, followed by the other. The order in which the accurate (A) and inaccurate (I) webpages were presented alternated across the three topics and counterbalanced across participants (AI, IA, AI vs. IA, AI, IA). They were instructed to read the webpages aloud to ensure all children read the text fully. When they had read both webpages, they were provided with the question sheet for that topic. Both webpages remained in front of them while they answered the questions (webpage location – left or right – corresponded to the order in which the webpages were read and were therefore counterbalanced), and they were reminded to check both webpages before writing down the answer, for example, 'The first question is: "What are guitars made of?" The webpages said different things didn't they? So I want you to check both of them again, think about which webpage is right, and then write your answer there. And then do the same for the second question'. This procedure was repeated for the remaining topics.

Following the task, children were asked a series of post-test questions. First, they were presented with each of the webpage pairs again, in the order of initial presentation, along with their answer sheets. For each topic, they were asked why they had selected each answer. These questions were administered after the trust trials phase to avoid artificially prompting children to reflect on their choices during the trust task. Next, they were shown each pair of webpages again, in the order of initial presentation, and they were asked, 'When you read these two webpages earlier, did you notice that one of them had some mistakes in it or said things that were not true?' If they replied 'yes', they were asked which one. If they gave the correct answer, they were asked to read that webpage again and point out all the inaccuracies within the text. If they stated that they had not noticed that one webpage contained inaccuracies or incorrectly identified the inaccurate webpage, then the inaccurate webpage was identified for them and they were asked to read it again and point out any errors they found. To finish, E identified all the inaccuracies for participants to ensure they did not leave the study believing any misinformation.

Results

Did children select information from the accurate webpages?

Participants received 1 point for each answer they selected from the accurate webpage, giving them a total score between 0 and 2 for each condition. We conducted one-sample Wilcoxon signed rank tests comparing performance against chance (score of 1) per condition, using the Bonferroni correction with adjusted alpha levels of .0167 per test (.05/3). These indicated that children performed above chance only in the typos condition, $M = 1.29$, $SD = 0.74$, $z = 2.56$, $p = .011$, $r = .37$. Children performed no differently to chance in the factual inaccuracies and exaggeration conditions, $M = 1.10$, $SD = 0.69$, $z = 1.04$, $p = .30$, and $M = 1.02$, $SD = 0.73$, $z = 0.20$, $p = .84$, respectively.

Next, we examined whether the subgroup of children who in the post-test questioning correctly identified the inaccurate webpage, selectively trusted the accurate webpage, per condition. (These participants responded with 'yes' to the question, 'Did you notice that one of the webpages had mistakes in it?' and then correctly identified the inaccurate webpage. Note that in all but two instances, children who said they had noticed that one of the webpages was inaccurate went on to identify that webpage correctly.) For the typos condition, performance was significantly above chance (Bonferroni-adjusted alpha levels of .0167), $n = 38$, $M = 1.42$, $SD = 0.68$, $z = 3.27$, $p = .001$, $r = .53$. However, performance was at chance for the factual condition, $n = 30$, $M = 1.17$, $SD = 0.70$, $z = 1.29$, $p = .20$ and for the exaggeration condition, $n = 20$, $M = 1.40$, $SD = 0.75$, $z = 2.14$, $p = .033$, $r = .48$.

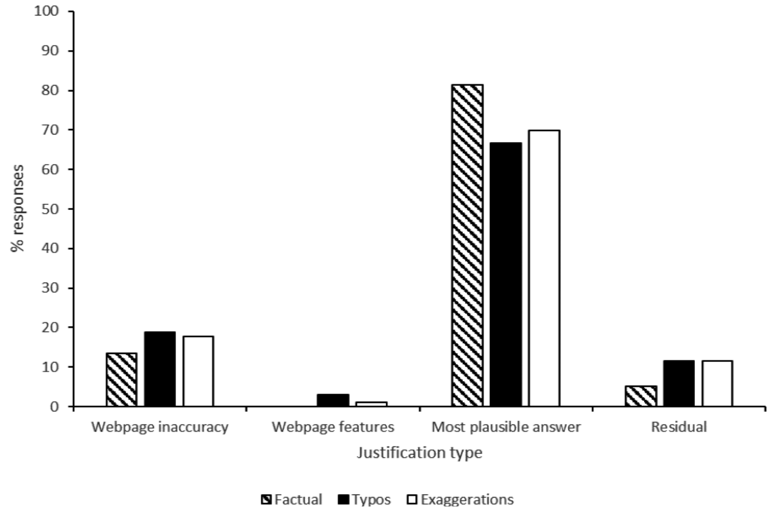

Figure 1. Frequency distribution of justification types, collapsed across questions, as a function of error condition.

Why did children say they selected their chosen answer?

Justifications provided for each answer were coded into four categories: (1) webpage accuracy/inaccuracy (e.g., 'It says a bunch of things that aren't true'; 'other webpage says it snows every day and this one says it sometimes snows'; 'I don't believe the other one because the person might have been a child, a grown-up can spell but a child can't'); (2) other webpage features (e.g., ''This webpage looks more recent'; 'I believe this webpage, it has more detail'); (3) selected the answer which seemed most plausible (e.g., 'It is very cold in the North Pole so I chose the coldest temperature'; 'grandads give more presents than uncles'); and (4) residual (unsure/miscellaneous responses, e.g., 'It's just a guess'; 'I've never heard of wood called ash'). Only 16 out of 48 participants (33%) ever cited webpage accuracy as the reason for their choice of answer (four participants did so on just one trial, five on two trials, two on three trials, one on four trials, and four participants did so across all six trials). Figure 1 presents the proportion of responses from each category, for each error condition. The most common justification type was an explanation of why they viewed the chosen answer as more plausible than the alternative answer. Given this finding, we checked whether children, as a group, displayed a systematic bias towards one of the answers for each test question. Although no significant biases were found when applying the Bonferroni correction for multiple comparisons (adjusted alpha levels of .008 per test), there were notable bias trends in the typos conditions only (66% picked 'spruce' over 'ash' and 'grandad' over 'uncle', Binomial, $ps < .05$).

Could children detect the inaccuracies when prompted?

Participants received a score between 0 and 3 for each condition depending on the number of inaccuracies they detected and a total score out of nine. Performance was very similar across conditions (typos, $M = 2.69$, $SD = 0.59$; factual, $M = 2.54$, $SD = 0.65$; exaggerations, $M = 2.54$, $SD = 0.71$).The group mean for total score was high, $M = 7.75$, $SD = 1.33$ with 42 of 48 participants (88%) spotting at least two out of three errors for all conditions. (Note that excluding from analysis the six participants who failed to meet this criterion yields trust results comparable to those reported above.)

Discussion

Children growing up in today's digital world have access to unprecedented amounts of information of variable reliability. The ability to think critically about web-based sources is therefore of utmost importance. We examined whether 8- to 10-year-olds show reduced trust in inaccurate relative to accurate webpages, just as preschoolers distinguish between accurate and inaccurate speakers (e.g., Koenig *et al.*, 2004). Our study found that participants endorsed more answers from the accurate than the inaccurate webpage in the typos condition but not in the factual or exaggeration (semantic) conditions. Importantly, when prompted to look for the inaccuracies, children's error detection was good for all error types, suggesting that failure to reject the webpage with semantic inaccuracies was not due to children lacking the relevant knowledge to recognize the misinformation.

We had anticipated that factual inaccuracies and exaggerations should influence children's selective trust given that these cues provide strong grounds for questioning the accuracy of other information on the webpage. However, participants' justifications for their decisions indicated that few children explicitly reflected on the webpages' overall level of accuracy. Instead, decisions were most frequently based on the option choices themselves, even though these had been designed to be similar in plausibility and ultimately inconclusive. Perhaps, this type of response was merely a way for participants to rationalize a random choice. Alternatively, it may indicate that they were being evaluative but using a strategy that focused on judging the likely accuracy of the conflicting novel information rather than taking into account the accuracy of the surrounding content. In order to notice the semantic inaccuracies in our webpages, children needed to monitor continuously whether the text content confirmed or contradicted their prior knowledge as they read. If they failed to engage in this metacognitive strategy, then the accuracy of the source as a whole would not have featured in their decision-making. Rather, they may have focussed on the information that was most salient to them when answering the questions – the plausibility of the conflicting answer options.

Our data indicate that children may have been reading the text without reflecting critically on the meaning of the content. This is consistent with previous findings of children's (Baker, 1984, 1985) and adults' (Erickson & Mattson, 1981; Rapp & Salovich, 2018) limited awareness of misinformation in text. According to the dual-stage model of semantic validation, people have a default bias to accept incoming information as true, whereas it takes cognitive effort to subsequently validate information and mark it as false (Gilbert, Krull & Malone, 1990; Gilbert, Tafarodi & Malone, 1993).

Nonetheless, we found that some children were able to identify the inaccurate webpage in the semantic error conditions, when prompted to do so in the post-test questioning, suggesting they had encoded the inaccuracy. Yet, even these subgroups did not reliably reject the information from the inaccurate source. This finding is consistent with recent evidence from a selective trust task devised by Lucas *et al.* (2017). Children aged 8-10 years (but not younger children) ignored the known expertise of the model when deciding whose actions to copy to retrieve a prize in a novel puzzle box. Instead, they displayed a bias towards the action option that they deemed most plausible, even though both solutions were viable. In both studies, children's confidence in their intuitions or background knowledge may have led them to prioritize a preference for a certain answer irrespective of the source. Clearly, this strategy may be problematic if children make the wrong assumptions about information that is novel to them.

In the typos condition, by contrast, participants' answers were influenced by accuracy. Moreover, the effect of accuracy was significant despite an overall bias trend towards picking 'spruce' and 'grandad' as answers over 'ash' and 'uncle'. This suggests that children perceived typos as a salient sign of incompetence or carelessness that warranted general scepticism towards the source. Children's greater sensitivity to the typos compared with the semantic errors is consistent with previous error-detection work with children (Baker, 1984) and adults (Hacker, Plumb, Butterfield, Quathamer & Heineken, 1994). This can be explained by differences in processing demands: whereas detecting the typos required only recognising the orthographic in/accuracy of individual words, detecting the factual errors and exaggerations required integrating semantic information across words and validating the meaning of entire sentences against children's prior world knowledge. According to Isberner and Richter (2014), validation is contingent on sufficient depth of processing; shallow processing results in the construction of an underspecified mental representation that, in turn, results in less information on which validation can operate. In addition, whereas factual inaccuracies could be missed if children did not actively reflect on the meaning of the text, disruption to the flow of reading by the typos might have alerted children to these errors. Indeed, because participants read aloud in our study, they may have been particularly conscious of their reading fluency, thus increasing their sensitivity to the typos. It will therefore be important in future work to examine children's performance when they read silently.

The current study represents an initial foray into children's evaluation of webpage accuracy and sets the stage for a number of follow-up studies: First, our data imply that children paid less attention to factual inaccuracies and exaggerations compared to typos when deciding which source to trust regarding novel factual information. However, this conclusion is not currently justified given that the study was not designed to compare children's responses to the different error types directly. Specifically, we did not counterbalance the topics and test questions/answers across error types, given the already complex nature of our design. Future research is needed to extend the current study by comparing children's relative use of different error types in a more controlled design, for example, by manipulating the error type between participants, while keeping all other aspects of the materials and the test questions/answers constant.

In addition, it would be interesting to establish the 'error frequency' tipping point where most children would prioritize semantic inaccuracy in their trust judgements, and track how this changes with age. We chose to embed only three errors so that the source was consistently inaccurate while maintaining realism. However, it may be that children require more instances of errors to a) take note of this cue and b) relinquish trust in the source.

Furthermore, whereas we aimed to examine children's spontaneous accuracy evaluation without prompting them to scrutinize the webpages, future research should examine what factors would effectively prompt children to engage in this process. In our study, the webpages were selected by a responsible adult in an educational context. Although the experimenter presented the webpages neutrally without personally endorsing them in any way, children's vigilance may have been higher if the origins of the webpages were more dubious (e.g., links shared on social media).

It is not clear whether the results found for this study are likely to be specific to the digital domain or would hold for any kind of written media (e.g., books, magazines). On the one hand, we might expect children to evaluate the accuracy of the text content, and to use this criterion to influence their trust judgements, to the same extent whether the text appeared in a book or on a webpage. On the other hand, children may hold different expectations about the trustworthiness of traditional/Internet-based sources in general, which could influence the source evaluation process. More work comparing children's accuracy-related trust across traditional and digital written media is therefore needed.

Relatedly, the unique ways in which children process and interact with online text-based information (e.g., screen-based reading, scrolling down, clicking on links, having to ignore distracting information), as opposed to offline text, will likely impact the extent to which they attend to textual accuracy. For example, Halamish and Elbaz (2020) recently found that reading comprehension among 10- to 11-year-olds was better when identical texts were read on paper than on screen. This may contribute to less effective error monitoring during screen-based reading. A limitation of the current study is that participants viewed the webpages as printouts rather than on a computer screen. This meant that although we presented participants with Internet-based sources, they experienced them in an offline context. It will be important in future work to assess to what extent our results generalize to a more naturalistic set-up where children view and interact with the webpages online.

Finally, whereas we focused on 8- to 10-year-olds, the current findings leave open questions about developmental changes in children's accuracy evaluation online as well as factors underlying individual differences (e.g., reading proficiency, motivation to engage in critical thinking, levels of trust in Internet content more generally, prior parental guidance relating to source evaluation online). Moreover, research suggests that epistemic evaluation of online sources is unsophisticated even among adults (e.g., Barzilai, Tzadok, & Eshet-Alkalai, 2015; Gerjets, Kammerer & Werner, 2011) and adults' trust judgements do not always take accuracy of content into account. Lucassen and Shraagen (2011) found that readers were not influenced by the factual accuracy levels of a Wikipedia article when deciding whether they trusted it. However, this was true only of readers who were novices with respect to the specialized content domain of the article, and therefore struggled to evaluate the veracity of the content, not readers who were domain experts. To the best of our knowledge, no previous study has directly examined whether adults would reliably select information from an accurate webpage over one that contains obvious errors. While we confirmed that adults performed at ceiling on our task, it will be valuable to develop an age-appropriate version of the materials to examine to what extent limitations in distinguishing between accurate and inaccurate online sources exist beyond childhood.

Our findings have educational implications, supporting calls for more critical digital literacy instruction within schools (House of Lords, 2017; National Literacy Trust, 2018), and indicating a potential focus for intervention. Specifically, they suggest that 8- to 10-year-olds require additional support to get them into the habit of evaluating webpage content for factual accuracy and exaggerations. A goal for future work is to establish effective ways in which to do so. One possibility could be for teachers to give students more opportunities to practise spotting webpages that contain inaccuracies rather than providing them with teacher-vetted websites. Furthermore, teachers may need to reinforce the importance of taking into account a source's overall accuracy when deciding whether to believe any claims it makes relating to unknown information. The material used in the current study related to neutral facts but these skills will be even more crucial when it comes to information with moral relevance, as well as social, political, and health-related topics. Although 8- to 10-year-olds may rarely encounter websites on such topics, it is clearly essential to ensure that they are equipped with the right critical tools, and the motivation to use them, before they begin to access value-laden or controversial content.

In conclusion, the current work demonstrates the relevance of extending research on children's selective trust to the digital domain. Although children discriminate between accurate and inaccurate speakers from an early age (Koenig *et al.*, 2004), we found that 8- to 10-year-olds paid limited attention to whether or not webpages contained errors when deciding on which source to rely for novel information. Consistent with previous research showing that children do not consider the credentials of online sources, our findings suggest that they may also be at risk of placing their trust in factually inaccurate sources.

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Conflicts of interest

All authors declare no conflict of interest.

Author contributions

Shiri Einav, Ph.D (Conceptualization; Formal analysis; Investigation; Methodology; Project administration; Resources; Supervision; Writing – original draft; Writing – review & editing) Alexandria Levey (Investigation; Methodology; Project administration; Writing – review & editing) Priya Patel (Investigation; Methodology; Project administration; Writing – review & editing) Abigail Westwood (Investigation; Methodology; Project administration; Writing – review & editing).

Data availability statement

The data that support the findings of this study are available in figshare database (https://doi.org/10.6084/m9.figshare.12116727.v1)

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Supporting Information

The following supporting information may be found in the online edition of the article:

Appendix S1. Piloting and task development.

Appendix A:

Examples of errors contained in the inaccurate webpage of each topic

Type of error (topic)	Error 1	Error 2	Error 3
Factual inaccuracies (North Pole)	'Polar bears have thick stripy fur'	'Arctic foxes are a type of fish and live in the sea'	'Seals are bright green mammals'
Typographical errors (guitars)	'string familee'	'blay'	'famouz musicians'
Exaggerations (seasons)	'It snows every day during winter'	'Summer months are the warmest and it never rains'	'The fallen leaves make piles as tall as an adult when they are swept up together'

Appendix B:

Test questions and conflicting novel information provided by the two webpages

Question	Answer option 1	Answer option 2
How many people say winter is their favourite season?	Five out of 10	Six out of 10
When did the tradition to give chocolate eggs at Easter begin?	250 years ago	150 years ago
How cold can it get in the North Pole?	−50 degrees	−60 degrees
How thick is the ice in the North Pole?	2–3 metres	4–5 metres
What are guitars made of?	Wood from ash trees	Wood from spruce trees
Who gave Ed Sheeran his first guitar?	His uncle	His grandad