Using Media Literacy to Fight Digital Fake News in Later Life: A Mission Impossible?

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Abstract. Fake news is a threat to the trustworthiness of digital information sources. Media literacy training that can be used to empower people to fight fake news - understood to refer to any kind of misleading information that could mistakenly be considered accurate, regardless of the mechanisms that led to its propagation [1] - is mostly oriented toward younger people in an educational institutional context. Yet in later life, older people, too, may benefit from such training. Are there appropriate institutions to provide this? In this paper we explore the possibility of enhancing older people's digital resilience [2] using insights from the field of media literacy to answer the following research questions:

1. To what extent are older people vulnerable to fake news?
2. To what extent are older people able to learn to become digitally resilient?
3. What institutions could play a role in providing media literacy training specifically tailored for older people?

Finally, we will present some implications for future research in this field.

Keywords: fake news · digital resilience · media literacy training · generations · younger people · older people

1   Introduction

In our society, access to digital information is of prime importance. De Jong and Rizvi [3], in *The State of Access: Success and Failure of Democracies to Create Equal Opportunities*, argue that democracies are judged by whether citizens have equal access to public services (a primary good [4]), economic opportunities, justice and participation in the democratic process. Anno 2023, we can add citizens' access to reliable digital information (https://education.ec.europa.eu/focus-topics/digital-education/action-plan/action-7). Bovens (2002) [5] and Bovens and Loos (2002) [6] even suggest that the equal right of access to information should be considered a basic right of all citizens, on a par with the classic (human) rights.

In this media landscape, fake news ("any kind of misleading information that could mistakenly be considered accurate, regardless of the mechanisms that led to its propagation" [1, p. 204] plays an increasingly important role, particularly with the rise of

social media. "*Fake news* is not a new phenomenon ([7, 8] because the partisan press has always peddled biased opinions and stories lacking factual basis [8]. New technologies, from the telegraph in the 19th century to contemporary social media algorithms, have led to the proliferation of fake news [7]." [9, p. 147].

In their empirical study 'The spread of true and false news online!', Vosoughi et al. (2018) [10] analyzed the differential diffusion of all of the verified true and false news stories distributed on Twitter from 2006 to 2017 (~126,000 stories tweeted by ~3 million people more than 4.5 million times). They classified news as true or false using information from six independent fact-checking organizations that exhibited 95 to 98% agreement on the classifications. They concluded: "Falsehood diffused significantly farther, faster, deeper, and more broadly than the truth in all categories of information, and the effects were more pronounced for false political news than for false news about terrorism, natural disasters, science, urban legends, or financial information." [10, p. 1146].

Hence, enabling citizens to build digital resilience [2] is of the utmost importance. To achieve this, a media literacy approach can be applied: "Media literacy should not only focus on people's ability to use certain devices and technologies, but also on promoting a deep understanding of modern forms of media, how these work and how they produce and use news items, all of which may be attained through systematic media education programs [11]. It is of course important to investigate the feasibility of interventions at an early age to empower young citizens such that they are able to establish the trustworthiness of news." [1, p. 293] The European Commission therefore "encourages fact-checkers and civil society organizations to provide educational material to schools and educators and include targeted initiatives on disinformation online in the #SaferInternet4EU Campaign" (https://ec.europa.eu/digital-single-market/en/tackling-online-disinformation). It is also essential, though, not to focus solely on young citizens; we should also involve older generations as "due to the paucity of studies in this field, it would be naive to assume that they are not vulnerable to fake news" [1, p. 293].

We therefore advocate the implementation of educational measures to tackle the consumption of fake news, such as promoted by the European Commission's flagship Digital Education Action Plan (2021–2027) (https://education.ec.europa.eu/focus-topics/digital-education/action-plan/action-7) that presents guidelines providing support for teachers and educators in addressing the pressing topics of disinformation and digital literacy in the classroom, see also [1, 12].

Primary school children have difficulties assessing the reliability of digital information [12–19]. For this reason, media literacy programs in primary schools offer guidance on how to deal with fake news (see for example: https://education.ec.europa.eu/news/ guidelines-for-teachers-and-educators-on-tackling-disinformation-and-promoting-digital-literacy-through-education-and-training). *Secondary school pupils* also need - and get - training in this field (e.g., [20–25]). And the following studies clearly show that *university students* also have difficulties assessing the reliability of digital information [26–34], but extensive media literacy programs to fight fake news of the kind developed for primary and secondary school pupils, are not available for this group. In Sect. 2.1, the results of the above-mentioned empirical studies related to younger people's vulnerability to fake news will be discussed, and in Sect. 2.2 the results of empirical studies related to older people and fake news will be presented.

Building digital resilience [2] is not only crucial for younger, but probably also for older people. In this paper, we therefore explore the following research questions:

1. To what extent are older people vulnerable to fake news?
2. To what extent are older people able to learn to become digitally resilient?
3. What institutions can play a role in providing media literacy training specifically tailored for older people?

2 Fake News: A Generational Approach

2.1 Younger People's Vulnerability to Fake News

Empirical studies such as [12–34] clearly show that *younger people* are vulnerable to fake news. We will briefly discuss the results of several studies that looked at various different age groups. These show that younger people's abilities to detect and avoid being exposed to fake news, from primary school children to more cognitive complex individuals such as university students, were rather poor.

Primary School Children
In 2017, inspired by a study conducted 10 years previously in the U.S. [13], we ran a study in the Netherlands to examine whether school children, 11 to 12 years of age, were able to recognize a website (*Save The Pacific Northwest Tree Octopus*, http://zap atopi.net/treeoctopus/) as a fake [12]. The results of this Dutch study were intriguing, as they showed an even higher vulnerability compared to the U.S.-study among 13-year-old school pupils conducted 10 years before. Only 2 out of the 27 school children participating in the Dutch study identified the website as being a hoax, compared to 6 out of 53 in the US study. Emotional involvement may have played a role (the topic was an animal in danger), making it more difficult for them to perceive the information as fake. Possibly, too, the fact that the information had been endorsed by their teacher made them less critical about the trustworthiness of the information.

The results were also disturbing because it might have been expected that in the ten-year period between the two studies, people (including primary school children) would have become more and more familiar with the idea that some of the information obtained through the use of digital technologies might well be fake.

A recent study conducted in Brazil [14] with two groups of seventh-year children at a private bilingual school used the research design developed by [12] revealed that none of the 40 school pupils could identify the site as being a hoax.

Along those same lines, in 2020, Dumitru [15] conducted a study among Romanian primary school children (26 girls and 28 boys) in the local language featuring a website about a fake animal (https://salvamjacalopul.wordpress.com/). In this study, a group of primary school children (aged 10–11) was compared with a similar group of high school pupils (aged 18–19). The results in both groups were similar, with neither group demonstrating good capabilities of identifying the website as a hoax. Although the adolescent group was more inquisitive, showing a more complex way of treating information compared to the primary school children, this group, too, was found to lack the digital resistance needed to recognize fake information. Disturbingly, when confronted with a fake website, even the school pupils exhibiting more critical thinking styles in

both the primary school group and the secondary school proved to be susceptible to fake news.

Similar results were found in another recent study [16], conducted in the U.S., in which 86 primary school children were respectively asked to judge the veracity of ten news stories, five fake and five true: not only were they unable to identify the fake information, their performance did not vary by age or by their scores on a cognitive reflective text.

The study by Dumitru [15] enriched the findings by adding group discussion to understand how the school pupils approached the information from another hoax website. The results showed that some, mainly those in the primary school group compared to the high-school pupils, regarded the information as being trustworthy and did not bother to check, even though they had Internet available. Others doubted the existence of the animal, but were prepared to share the information, as it was "cute". For some school pupils, the fact that "an expert" – in this case the researcher – had introduced the website counted as a guarantee of the accuracy of the information.

Another study [17] conducted in the U.S. also used the fake website of *Save The Pacific Northwest Tree Octopus* to test the reactions of primary school children. The study included 354 primary school children, ranging from first graders to fifth graders. This study found that the school pupils in the 5th grade were indeed more critical about the website and were less prone to trust the information (42%), but no linear effect of age could be established; for example, 80% of those in the 4th grade considered the website to be trustworthy, compared to 50% of those in the 2nd grade). Instead of age, other contextual aspects seemed more important in determining whether these primary school children judged the information to be reliable or not, namely, the strategies they used to determine the credibility of the website, such as prior knowledge of the subject, a check of the text features and general knowledge (factual knowledge).

In that same vein, study [18] underlined the role of educators and media literacy in allowing children from primary school to question fake information and reduce their vulnerability.

Study [19] recently explored media literacy strategies using a meta-analysis of sixteen research studies. The goal was to develop news literacy or media education in primary schools. The analysis showed that a strategy where primary school children are taught how to create their own news using text messages as well as videos, audios, pictures and animations was the most effective in equipping them with the proper skills to recognize fake news.

To conclude, primary school children are vulnerable to fake news, unless they are familiar with the content (because they have studied a particular subject or have a wealth of general knowledge). Even if they doubt the trustworthiness of the information, they will still tend to share or act upon it, especially if the information is "cute" [15] and worth sharing with peers; or an authority like their teacher or a researcher has endorsed it. Emotional involvement also plays a role; for example, the fact that the information concerned an animal in danger made it more difficult for them to perceive the information as fake [12]. Their ability to fight fake news does not necessarily increase with age or with the development of reflexive skills. In primary school children, therefore, an effective strategy to promote media literacy and to address fake news vulnerability could be to

have them practice by creating news items of their own, using multi-modal elements such as text messages, as well as video, audio, pictures and animations [19].

Secondary School Pupils
Other research also looked at the vulnerability of adolescents between the ages of 14 and 18 to fake news.

A report released in 2016 by the Stanford History Education Group presented the results of a study [20, 21] examining the capabilities of pupils in middle school through college of judging the credibility of information. Several online tasks were administered to 7,804 school pupils, asking them to evaluate information found on the internet, and particularly on social media sites. The main conclusion regarding their social media use was: "Our "digital natives" may be able to flit between Facebook and Twitter while simultaneously uploading a selfie to Instagram and texting a friend. But when it comes to evaluating information that flows to social media channels, they are easily duped." [20, p. 4].

Dumitru [15], in the more recent study referred to above, found that secondary school pupils (last years of high school, 18–19 years of age) reacted to a fake website in almost the same way as primary school children. Although teenagers were more skeptical about the fake information, their skepticism did not help them in "taking action" and they did not check the veracity of the information.

Marchi (2012) [22] used individual interviews and focus groups, recruiting 61 participants from U.S. high schools between the ages of 14 and 19, to explore how teenagers viewed news, and found that "teens gravitate toward fake news, "snarky" talk radio, and opinionated current events shows more than official news, and do so not because they are disinterested in news, but because these kinds of sites often offer more substantive discussions of the news and its implications." (p. 257).

In the case of secondary school pupils, interactive strategies, such as the use of games, proved to be more effective in increasing their abilities to distinguish between real and fake information [23, 24] (see also https://inoculation.science/inoculation-games/).

Another study [25] focused on more sophisticated strategies of fact checking, such as footing, taking bearings and lateral reading for high school pupils. Given by experts or by their teachers, this type of training proved to be effective, leading researchers to advocate their inclusion in the curriculum.

Although pre-test and post-test experiments conducted in the studies described above demonstrated the efficiency of teaching secondary school pupils fact-checking techniques, it is unclear whether adolescents will implement these strategies in their online interactions in the long run after the literacy training.

University Students
Studies involving adult students (mainly undergraduates) have included a number of variables to understand their vulnerability to fake news, starting from the assumption that there is a combination of task characteristics, individual aspects and media literacy differences that could be considered. For example, a study on undergraduate students' reactions to information about climate change [26] showed that when students were asked to summarize the information and construct arguments starting from the information, they were more able to distinguish between the reliable and less reliable pieces of information. Also, the effect was moderated by the reader's prior beliefs, proving

that individual aspects (attitudes, beliefs) always play a role in the success of particular cognitive strategies. This particular study showed that having an overview of a particular subject without allowing people to summarize or formulate their own arguments, made them particularly vulnerable to fake news. Academic education should therefore stimulate students not only to access overviews on different topics, but also to use their own mental capacities to react (with arguments) to different issues.

One important study conducted by Hargittai et al. (2010) [27] clarified the process by which people invest trust in online sources. It involved a relatively large number of students (N = 102) and deployed both quantitative and qualitative inquiry. Researchers asked students to rate different criteria of trust and gave them the opportunity to talk openly about how they made their decision to trust certain online sources and distrust others. Briefly, the results showed that some search engines (for example, google.com) are automatically invested with trust by students based on their familiarity with these; furthermore, the brand names of different online sources are automatically associated with specific positive or negative perceptions, while asking others also appeared to be a common strategy for students when deciding what information to trust. In addition, students' success in investing trust in reliable online sources also depended on their digital skills (digital experience and expertise). This particular study points out the process by which younger people might become vulnerable to fake online information and indicates the fact that people's perceptions of different online sources (and brands), as well as trusting others, are important factors in the equation, often ignored in previous studies.

Many studies exploring students' vulnerability to fake news have actually used a deterministic approach: tasks were assigned to students, and experts (researchers, teachers, trainers) then evaluated their (in) ability to distinguish between what is accurate and what is fake; what is credible and what lacks credibility. In some of these studies students proved to be as vulnerable as the other (younger) age groups. For example, a recent study [28] using the same *Save The Pacific Northwest Tree Octopus* fake website, explored first year students' ability to question the existence of the *Fake Tree Octopus*, as a part of a biology class. Similar reactions to those in the studies on that same website among primary school children (as described above) were seen, with many students not questioning the existence of the species described there. Also, students failed to recognize a real species when it was presented in a satirical way (using a YouTube video), when this was part of a biology lesson.

A Spanish study [29, p. 407] focusing on university students in Spain (Andalusia) concluded the following: "In order to ascertain the degree of credibility that young users in Andalucía give to information, this study presents the results of the evaluation of online news by university students pursuing degrees in communication and education (N = 188), using the CRAAP test. The data reveal differences in gender and degree program in the credibility assigned to the news. The conclusion is that university students have difficulty differentiating the veracity of the sources, in line with previous studies, with fake news earning higher ratings than real news."

Such surprising results [see also 30–34] could indicate a high vulnerability to fake information in relation to how the information is "framed": while a website presenting information in a structured way (similar to what students are used to being presented with

in classes) might *a priori* be perceived as "credible", presenting valuable information in a humoristic/satirical way could create the opposite effect, discrediting the information. To explore such an approach, a more phenomenological view, such as that deployed in the study conducted by Hargittai et al. (2010) [27], is needed, starting from the process by which people navigate through online content and invest trust in different online sources. However, strategies to reduce university students' vulnerability to fake news follow the same determinist path as described above in the case of primary and secondary school pupils: interventions in which students are exposed to "what needs to be done" when confronted with the need to assess the credibility of an online information source (e.g., website). In such situations, the efficacy of the training/intervention is judged by a pretest-and-post-test experimental design in which participants' abilities to judge the online information are evaluated prior and post intervention [31, 32]. To assess the long-time effect of the intervention, students were tested some weeks later [32]. The results were encouraging, showing that the effects of the intervention remained stable over time. Besides different fact-checking techniques [31] - of the kind used to train high school pupils - observational learning and feedback have also been tested in university students, with positive results [33].

Literacy Training for Younger People
This section has shown that younger people, in primary, secondary and university education are vulnerable to fake news, regardless of their age, and that media literacy training tools, including the use of games and fact-checking techniques, could certainly play a role in enhancing their capabilities in this field. Though the *short term* effect looks promising in reducing school pupils' vulnerability to fake news, the studies we discussed did not pay attention to the *long term* impact of media literacy interventions on the capabilities to deal with fake news Also, the role of cultural differences is still under-researched in this age group. It is also noteworthy that there are no studies that *compared the effectiveness of different media literacy strategies* in fighting school pupils' vulnerability to fake news.

2.2   To What Extent are Older People Vulnerable to Fake News?

It may be observed that the European Commission's flagship Digital Education Action Plan (2021–2027), to which we referred in our Introduction, presents guidelines for teachers and educators on tackling disinformation and promoting digital literacy through education and training, with the aim of ensuring that *younger people* (our emphasis) are equipped with the skills and competences to live and thrive in the digital age. This observation is confirmed by Dumitru et al. (2022) [1] in their overview of publications related to media literacy training and interventions and the extent to which these are evidence based from a generational perspective, who concluded: "We found that students and educators were the main target groups, almost wholly to the exclusion of other groups; that they took place mainly in educational settings; and that, at least in the case of the training sessions, they were not evidence based, which meant that neither the long-term nor short-term efficacy could be tested." (p. 291).

As far as we know, there are only a few studies focusing on the extent to which specifically *older people* are *vulnerable to* fake news. Though the special issue "Fighting

Fake News: A Generational Approach", in 2022 published by the journal Societies (https://www.mdpi.com/journal/societies/special_issues/fake_news) [35] examines the role of age in fake news consumption, the focus is on the young to adolescent age group. Empirical studies *comparing younger and older people's vulnerability to fake news* are rare.

Loos and Nijenhuis (2020) [36, p. 69] examined the way older people, compared to younger age groups, are at risk of consuming fake news: "Social media are increasingly being used by young and old as a source of information." They carried out an empirical study between the beginning of February 2018 and the end of June of 2018, disseminating 14 political fake news articles (e.g., relating to Brexit and Donald Trump) in the form of advertisements on Facebook and tracking user interaction with the fake content to analyze the number of users in the age groups 13–17, 18–24, 25–34, 35–44, 45–54, 55–64, 65+. Their results show that "the articles had a higher reach amongst the older age groups, as well as that many people likely took the headlines at face value without clicking on the link. The number of emotional responses posted by the pro-Brexit and pro-Trump groups was greater than those posted by the pro-remain and anti-Trump groups."

Michael and Sanson (2021 [37]) conducted two preregistered experiments in the U.S. (with data for the first collected between 31 January - 21 April 2018, and for the second on 2 May 2019) and found that "adults across a range of ages rely on information other than news content—such as how they feel about its source—when judging whether news is real or fake. Moreover, our findings help explain how people experiencing the same news content can arrive at vastly different conclusions." In other words, they argue that vulnerability to the consumption of fake news occurs in all age groups.

Moore and Hancock (2022) [38] state: "Recent research has identified older adults as a demographic group especially susceptible to fake news online. For example, during the 2016 U.S. presidential campaign, people 65 and older were twice as likely to be exposed to fake news on Twitter and seven times more likely to share fake news on Facebook than 18–29-year-olds [39, 40]". In their analysis of a nationally representative sample of mobile, desktop, and television media consumption over a period of nearly three years,

Allen et al. (2020) found that older individuals were substantially greater consumers of fake news than younger people [41].

Oxford Analytica (2020) [42] found that "The growing numbers of senior citizens in the US, their rapidly increasing adoption of social media and their high levels of voter turnout make their vulnerability to disinformation a matter of special concern. Other advanced democracies likely mirror the US experience."

We can therefore conclude that there are only a limited number of empirical studies examining older people's vulnerability to fake news [35–43]. The studies that are available do indeed indicate that older people consume fake news. Although we do not know if they are more vulnerable to fake news than younger people, at least a certain degree of susceptibility may be assumed.

To gain insight into ways to address older people's fake news consumption, we will now explore how a *media literacy* approach can be used to reach this goal in Sects. 3 and 4.

3 To What Extent are Older People Able to Learn to Become Digitally Resilient?

3.1 Aged Heterogeneity

Moore and Hancock (2022) [38] state: "Scholars have postulated that older adults' limited digital literacy may explain their heightened susceptibility to fake news online [40]." We take issue with this generalization, as it does not consider the diversity occurring within the group of older adults. Before discussing in Sect. 3.2 the extent to which older people are able to become digitally resilient [2], we must first take a closer look at the phenomenon of aged heterogeneity.

In a classic paper, Nelson and Dannefer (1992) [44] reviewed 185 gerontological studies to analyze the individual differences and empirical patterns of variability reported in these studies presenting measures of dispersion. They concluded that "Overall, a majority of all gerontological studies presenting data reported increases in variability with increasing age (65%). (…). The dominance of the pattern of increasing diversity does not appear to be domain-specific; the same general finding pattern emerged across physical, personality, and cognitive domains." (p. 17). Twenty-four years later Stone et al. (2016) [45] analyzed 2,307 gerontological papers during a 6-year window (2005–2010) and concluded: "Turning to the question of patterns of variability observed in those studies that report measures of variability, we have seen that the great majority of studies report either stability or increasing variability with age. However, the pattern varies substantially among outcome types. Half of the biological studies reported increasing variability, but only about a third of the psychological studies did so." (p. 4) See also [46–50] that confirm the occurrence of the aged heterogeneity phenomenon related to internet use by older people.

3.2 Using Tools to Fight Fake News in Later Life: Never Too Old to Learn

It is a myth that older people are not able to learn how to use digital information in their everyday life. Experience [46, 47, 49] and motivation [46] enhance the digital capabilities of older people considerably. And applied to the field of literacy, Grace and Hone (2019) [51] present the following interesting example of a game designed to serve as new literacy education tool: "The game underwent two primary designer iterations. As a result of design changes and renewed political chatter about fake news, the game's second iteration gathered more than 500,000 plays. The data collected reveals useful patterns in understanding news literacy and the perception of play experiences. These data, of more than 45,000 players, indicates that the older the persons the better they are at identifying fake news, until the approximate age of 70. It also indicates that higher education correlates to better performance at identifying real news from fake, although the time it takes to do so varies. This case study demonstrates the potential for such game designs to collect data useful to non-game contexts." (p. 8).

To enhance the digital resilience [2] of older adults, it is important to take into account aged heterogeneity as discussed above [44–50] as well as to consider their digital capabilities on a digital spectrum (Lenhart and Horrigan [52]). See also Van

Kampen et al. (2023) [53] who state that it is never too late to learn for the group they call "third-agers" as they experience little (self-) ageism or barriers to learning.

We can conclude that as older people are capable of learning digital competences, media literacy training and interventions can be used to enhance their digital resilience [2] and ability to fight fake news. This view is also supported by Rasi et al. (2021) [54, p. 37] who conducted a systematic review of 40 empirical studies published between January 2005 and April 2019, focusing on the promotion of media literacy among older people. However, they also noted that "interventions aimed at fostering media literacy in older people need further development and creative enrichment in terms of aims, content, providers, recipients, and pedagogical approaches." (p. 1).

4 What Institutions Could Play a Role in Providing Media Literacy Training Specifically Tailored for Older People?

In the above, we pointed out that the European Commission's flagship Digital Education Action Plan (2021–2027) presents guidelines for teachers and educators, with the aim of ensuring that *younger people* (our emphasis) are equipped with the skills and competences they need to live and thrive in the digital age. This observation is further borne out by the overview of publications related to media literacy training and interventions from a generational perspective, and the extent to which they are evidence based, presented by Dumitru et al. (2022) [1]. On the one hand, it would seem natural to start teaching media literacy to fight fake news at a young age, enabling the benefits. From acquiring these competencies early on to be reaped throughout an entire life span. As Loos et al. (2018) [12, p. 524] state: "As even college-age students have limited new literacies capabilities, it is important to start early and to educate young children on how to critically evaluate online information." On the other hand, it would not be fair to focus solely on the young, leaving older people without media literacy capabilities vulnerable to fake news. Training opportunities must be created for the older population as well. It is a human right [55] to improve their digital and online abilities and boost their digital resilience [2] by enabling them to acquire media literacy.

We argued in Sect. 2 that, although older people are indeed vulnerable to fake news, they are also well able to learn how to become digitally resilient, as was shown in Sect. 3. The question which then arises is how to enable them to acquire the media literacy capabilities needed to identify and establish whether or not information can be trusted. As older people have long since left the school system, it is important to evaluate which institutions would be suitable for teaching this group the media literacy skills needed in order to deal with fake news in their everyday life. The University of the Third Age (U3A) (https://www.u3a.org.uk/) in the UK, the Lifelong Learning Institutes in the US (https://en.wikipedia.org/wiki/Lifelong_learning_institutes) and the Université du Troisième Age in French speaking countries, are good examples of such institutions. The same goes for Community centers, and Organizations for senior citizens (e.g., AARP, https://www.aarp.org/, media literacy institutions (e.g., https://www.mediawijsheid.nl/).

Then there are the institutions offering older people help with developing their digital skills. Examples include Senior web in Switzerland and the Netherlands (e.g., https://seniorweb.ch/; https://www.seniorweb.nl/). Instead of solely focusing on technical skills and safe internet use for older people, such an institution could additionally offer a media literacy course. A good example of an online course, specifically developed for older people (related to the 2020 U.S. election, https://www.poynter.org/shop/fact-checking/mediawise-for-seniors-hands-on-lessons-on-separating-fact-and-fiction-online/ and https://www.poynter.org/shop/fact-checking/how-to-spot-misinformation-online-july-2021/) is Media Wise for Seniors in the US. Moore and Hancock (2022) [38] evaluated this online course by conducting a 1-h intervention, composed of self-directed series of interactive modules designed to teach concepts and skills for identifying misinformation online, and concluded that "consistent with our pre-registered hypothesis, older adults (M age = 67) in the treatment condition (N = 143) significantly improved their likelihood of accurately discerning fake from true news from 64% pre-intervention to 85% post-intervention. In contrast, older adults in the control condition (N = 238) did not significantly improve (from 55% to 57%). The treated older adults were also more likely to employ strategies for identifying misinformation online compared to pre-intervention and the control group."

Libraries can play an important role in teaching media literacy to older people by giving in-person and online courses (e.g., using an interactive approach or video tutorials), see also [56, 57].

Finally, intergenerational knowledge transfer from children who have received media literacy training at school to their (grand) parents could also be an interesting option. In that way the children would act as so-called warm experts [58, 59].

5   Conclusions

1. To what extent are older people vulnerable to fake news?
A range of empirical studies show that younger people, regardless of their age, in primary, secondary and university education are vulnerable to fake news, and media literacy training tools, including the use of games and fact-checking techniques, could certainly play a role in enhancing their capabilities in this field. But there is only a limited number of empirical studies on older people's vulnerability to fake news [35–43]. The studies that are available show that older people do, indeed, consume fake news. Although we do not know if they are more vulnerable to fake news than younger people, they may be assumed to be vulnerable, at least to a certain extent.

2. To what extent are older people able to learn to become digitally resilient?
Older people are capable of learning digital competences. Media literacy training and interventions can be used to enhance their digital resilience [2] and enable them to become more adept at detecting fake news [1, 38]. To bolster the digital resilience of older people, it is important to take into account aged heterogeneity [44–50] and to evaluate their digital capabilities on a digital spectrum (Lenhart and Horrigan [52]. See

also Van Kampen et al. (2023) [53], who stated that it is never too late for "third-agers" to learn, as they experience little (self-) ageism or barriers to learning.

3. What institutions could play a role in providing media literacy training specifically tailored for older people?
As older people have long since left the school system, it is important to consider other institutions that would be suitable for teaching them the media literacy skills needed in order to deal with fake news in their everyday life. The following institutions could play a role:

- The University of the Third Age (U3A) (https://www.u3a.org.uk/) in the UK.
- The Lifelong Learning Institutes in the US (https://en.wikipedia.org/wiki/Lifelong_learning_institutes).
- The Université du Troisième Age in French speaking countries
- Community centers, Organizations for senior citizens (e.g., AARP, https://www.aarp.org/).
- Media literacy institutions (e.g., https://www.mediawijsheid.nl/).
- Organizations offering older people help in developing their digital skills, such as senior web in Switzerland and the Netherlands (e.g., https://seniorweb.ch/; https://www.seniorweb.nl/).
- Libraries can play an important role in teaching media literacy to older people by giving in-person and online courses (e.g., using an interactive approach or video tutorials), see [56, 57].
- Intergenerational knowledge transfer from children, who have received media literacy training at school, to their (grand) parents could also be an interesting option. In that way, the children would act as so-called warm experts [58, 59].

6   Implications for Future Research

To gain more insight into the dynamics underlying the effectiveness of media literacy tools designed to bolster resilience [2] to fake news in later life, the following four points should be taken into consideration. (1) It would be interesting for future empirical studies to adopt an intersectional approach, linking the role of age to gender, educational level. (2) Such studies should also pay attention to longitudinal impact. (3) Country differences must also be considered. (4) We strongly recommend using an experimental research design that compares the degree to which different media literacy tools are evidence based.

Finally, it is important to note that there are no studies *comparing the effectiveness of different media literacy strategies* in addressing older people's vulnerability to fake news.

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