

Skills and motivation jointly shape digital literacy among adolescents

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Abstract

Governments and international organizations have invested substantial resources developing digital literacy interventions for adolescents, with mixed evidence of their effectiveness. We argue that past interventions focus disproportionately on the provision of skills, overlooking the role of motivation, which multidisciplinary evidence suggests is a key determinant of learning. We report a preregistered experiment on a national sample of Spanish adolescents (ages 14–18) that independently randomizes skills (fake news discernment tips) and motivation (a prime matched to respondents’ pre-existing concerns about misinformation via an LLM). Descriptively, two-thirds of adolescents are overconfident in their ability to discern fake news — a pattern observed across demographic, political, and academic subgroups. Experimental results show that skills training improves discernment *only* when paired with a motivational prime; these interventions are ineffective or counterproductive when delivered alone. Adolescent digital literacy depends on the interaction of skills and motivation, thus informing the design of future interventions.

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Online misinformation represents one of the most widely recognized challenges facing democratic societies today.¹ Citizens are concerned about the threats posed by misinformation, with large majorities in democracies across the world agreeing that “made-up news and information” presents a significant problem for their country (Poushter et al., 2025).² Governments and international organizations have also identified digital literacy as a pressing priority, investing substantial resources into developing and deploying programs and policies to improve digital literacy across diverse populations (UNESCO, 2025; OECD, 2024; EU Commission, 2018).

Many digital literacy interventions focus on adolescents, who are thought to be especially vulnerable because they consume a large and growing share of their political information from online sources (Feio & Oliveira, 2024; Twenge et al., 2019; Dautrich, 2018) and often struggle to critically evaluate online content they encounter (Lemaire et al., 2025). For instance, one study found that 96 percent of U.S. teens failed to investigate the source of purportedly factual — but actually unreliable — information they encountered about climate science (Breakstone et al., 2021). A 2024 survey revealed that 76 percent of young people in the European Union believed they had been exposed to fake news or misinformation in the previous week; however, in the same survey, only 18 percent of young Europeans were very confident in their ability to identify misinformation (Starostin, 2025). This lack of digital literacy among adolescents may have profound consequences, distorting beliefs and attitudes during a politically formative period with potentially lasting consequences into adulthood (Sears & Valentino, 1997; Campbell et al., 1960).

In recent years, many experimental studies have sought to evaluate the effectiveness of digital literacy programs aimed at adolescents. While the content and format of interventions vary across studies, the typical approach focuses on the provision of new *skills*, such as lateral reading,

¹Consistent with prior research, we use the term misinformation to refer to factual claims that are false or unsupported by existing evidence or expert opinion, regardless of intent (Jerit & Zhao, 2020; Nyhan & Reifler, 2010). This definition encompasses related phenomena such as disinformation, fake news, conspiracy theories, and motivated interpretations. In the experiment presented below, we rely on cases of cases of misinformation that were identified by independent fact-checking organizations.

²These majorities agree that made-up news and information is a “moderately big problem” or “very big problem” in their country (the other response options were “small problem” or “not a problem at all”); see Poushter et al. 2025 for more information.

source verification, fact-checking, and civic reasoning.³ Results are decidedly mixed. Some experimental studies find that skills-enhancing interventions significantly improve adolescents' ability to distinguish between true and fake news (Amar et al., 2025; Orosz et al., 2024); however, other studies have documented null or even backfire effects of these interventions (Badrinathan, 2021; Ghazi et al., 2025; Nygren & Efimova, 2025; Tamboer et al., 2024). From the perspective of the educator or policymaker, it is unclear what lessons to take from these mixed findings and which elements of potential digital literacy interventions should be prioritized.

While the development of new skills is a necessary component of any digital literacy curriculum, we argue that existing approaches overlook the role of *motivation*, which multidisciplinary evidence suggests is an important predictor of learning and which we expect to play a particularly important role among young people when evaluating online content about politics. In what is arguably the most influential theoretical model of political learning, Downs (1957, ch. 13) argues that the costs of becoming politically informed are substantial and outweigh the potential benefits for nearly all voters in large-scale democracies. As a result, many citizens are reluctant to invest time and effort developing political skills (also see Somin 2013; Caplan 2007; Delli Carpini and Keeter 1996). Compared to adults, adolescents are lower in political experience, interest, and knowledge (Delli Carpini & Keeter, 1996; Johann & Mayer, 2017; Hart & Atkins, 2011; Chan & Clayton, 2006; Galston, 2001; Jennings & Niemi, 1981). We therefore expect that most adolescents have low intrinsic motivation to internalize digital literacy skills (even when provided in age-appropriate, accessible formats) and to apply them when consuming political content. Successful digital literacy interventions aimed at adolescents must therefore both provide new skills and stimulate motivation.

Educational research has consistently found that that perseverance of effort is associated with higher achievement in conventional academic subjects (Credé et al., 2017; Muenks et al., 2017).⁴ It is unclear, however, how important perseverance of effort is for tasks that have a primarily

³For instance, recent experimental studies have considered in-school lessons (Amar et al., 2025; Badrinathan, 2021), online exercises (Orosz et al., 2024), games (Barzilai et al., 2023; De La Hera et al., 2024), mobile applications (Hartwig et al., 2024), and interactive chatbots (Alonso-Molina et al., 2024), among others.

⁴These findings are based on analysis of one component of the “grit” construct (Duckworth et al., 2007), with the other component being consistency of interests over time.

73 out-of-school application, such as discernment of misinformation. From the point of view of the
74 policymaker or educator, researchers have not had much success in designing interventions that
75 systematically change students' mindsets and effort, as a recent meta-analysis has found (Sisk
76 et al., 2018). There is some evidence, however, that intensive curricular interventions have been
77 successful in increasing effort, particularly among the most disadvantaged and academically at risk
78 or demotivated students. These in-classroom interventions have focused on explaining to students
79 causal chains from neuroplasticity to effort to performance through case study instruction and the
80 cultivation of deliberate practices of effort (Alan et al., 2019; Santos et al., 2022). Interventions of
81 this kind are intensive in terms of teacher and class time (e.g., more than 24 class hours in Alan
82 et al. 2019) and not targeted at a particular dimension of effort. This suggests a need for more
83 feasible, lower-intensity interventions specifically designed to improve digital literacy.

84 One low-intensity, highly scalable approach to motivating adolescents involves highlighting the
85 concrete risks of misinformation and corresponding benefits of becoming more digitally literate.
86 One could imagine several motivational appeals along these lines focusing on, for example, the
87 broad social and political consequences of misinformation or private costs to the individual, such
88 as confusion or opinion distortion. Research suggests that extrinsic motivations like these can be
89 harnessed to stimulate behavioral change across a wide range of domains from energy conservation
90 to voter turnout (Bolsen et al., 2014; Druckman & Green, 2013; Sinclair, 2012; Cialdini &
91 Goldstein, 2004; Gross et al., 1974). Extrinsic motivational appeals may be especially effective
92 among adolescents, compared to other groups, for the reasons discussed earlier. We do not offer
93 predictions about the effectiveness of different types of motivational appeals and have no reason
94 to believe that they are homogeneous across adolescents with different characteristics. However,
95 this research leads us to expect that there will be *some* motivational appeals that (if received and
96 accepted) will induce adolescents to invest greater attention and cognitive effort into learning digital
97 literacy skills. As a result, skills-enhancing interventions (e.g., tips or trainings) should be more
98 effective when accompanied by a prime that highlights salient extrinsic motivations.

99 Importantly, our argument does not imply that skills-enhancing interventions will necessarily be

ineffective unless accompanied by motivational appeals. To the contrary, based on past research, we expected that skills-enhancing interventions will, on average, improve digital literacy across all adolescents (H1) — including those with varying levels of preexisting motivation. Our key point is that the positive effects of skills-training on digital literacy will be amplified when motivations are also stimulated; based on the same logic, we expect motivational primes to increase adolescents’ willingness to invest time and effort in using digital literacy resources when offered the chance.

Our key preregistered hypotheses are therefore that:

Exposure to a motivational prime will increase the effectiveness of digital literacy tips (H2) and increase the voluntary uptake of digital literacy resources (H3).

We test these hypotheses with preregistered experiments conducted on a national sample of teenagers (age 14–18) in Spain. Our experimental design, which we describe in greater detail in the Methods section below, randomizes two factors: skills training (an infographic containing digital literacy tips) and an individually targeted motivational prime. For respondents randomized to receive a motivational prime, we use a large language model to present them with one of three pre-determined primes that most closely relates to their pre-existing concerns about misinformation (measured in an open-ended survey question).⁵ All respondents are then presented with a randomized subset of true and fake news posts and asked to evaluate the reliability of each (Figure 1 provides an example of two posts used in our experiments). We measure adolescents’ ability to distinguish true from false news (called *fake news discernment*, following Guay et al. 2023) and their willingness to opt-in to receive more information about digital literacy resources. Overall, this design allows us to estimate the effect of skills training on fake news discernment and the extent to which that effect varies among adolescents with varying levels of motivation.

⁵Our primes focus on extrinsic benefits that prior research has found are effective at stimulating costly action in other domains: generalized risk, in-group risk, and in-group responsibility.

Figure 1: Example news items used to evaluate discernment



(a) Example true item



(b) Example false item

Results

Predictors of objective and subjective political skills

Before turning to our experimental analyses, it is useful to understand baseline levels of digital literacy and related attitudes among adolescents in our sample. Here, we analyze non-experimental questions from the survey we present below.⁶ We consider a series of outcome variables, which we categorize into objective or subjective measures (left and right panels of Table 1, respectively). Objective measures include fake news discernment, political knowledge, and belief accuracy. Subjective measures include self confidence in fake news discernment ability and epistemic political efficacy (EPE; Pingree 2011), which captures confidence in one’s ability to tell true from false claims in politics. We examine the individual-level predictors of these actual and perceived political skills.⁷

⁶Of the questions analyzed in this section, all except fake news discernment were measured in the pre-experimental sections of the survey. For our analysis of discernment, in these descriptive analyses we limit the sample to control respondents because they represent a clean (no skills training) baseline.

⁷This model was preregistered as RQ1. We deviate from the preregistered specification by adding additional measures of academic engagement, including interest in school, grit, and grade point average (GPA). These measures were added in light of the experimental results presented below.

Because outcome variables are measured on different scales, we normalize them to 0–1 for ease of interpretation. (We display means and standard deviations of each outcome variable, measured on its original scale, in the bottom row of Table 1.)

The descriptive results are shown in Table 1. Beginning with fake news discernment (column 1), we find that mean discernment is quite low, with true stories rated as only 0.98 points more reliable than false stories on average — less than 25 percent of the four-point response scale. The distribution of the fake news discernment outcome variable is visualized in Figure 2. The figure displays the distribution of fake news discernment scores (left panel) and respondents’ average rating of true and false stories (right panel), among those respondents in the control condition. Discernment scores are normally distributed around a mean of 1.02 ($sd = 0.66$), indicating that respondents rate true stories as about 1 point (or 25%) more accurate than false stories on average. Respondents give true stories an average rating of 2.93 (0.60) on the 4-point scale, corresponding to a rating of “very accurate.” By contrast, they rate false stories 1.92 (0.41), corresponding to “not very accurate” (difference: $p < .001$). As shown in the right panel of Figure 2, ratings of false stories are normally distributed; by contrast, ratings of true stories are more non-normal, with many “false negatives,” or ratings of true stories as unreliable. This indicates that misclassified stories are overwhelmingly true stories that are rated as unreliable. In the analyses that follow, we examine whether changes in discernment are driven by changes in the perceived accuracy of true stories, false stories, or both (Guay et al., 2023).

[Table 1 to appear here]

Turning to the predictors of fake news discernment (Table 1 column 1), we find only one significant predictor: sex. Women perform significantly worse than men on our discernment tasks.⁸ The lack of other significant predictors suggests that fake news discernment is a widespread challenge among teens. Perhaps most striking, despite scoring higher on political knowledge, highly interested teens perform no better than their less interested teens on fake news discernment.

⁸However, research suggests that observed gender gaps in political sophistication are sensitive to measurement approaches (Kraft, 2024).

157 Similarly, high academic performing students (as measured by interest in school and GPA) score
158 higher than their lower performing peers on political knowledge, but fare no better when it comes to
159 fake news discernment. Altogether, this pattern of results suggests that fake news discernment may
160 pose a unique challenge for teens, including those who perform well in school and on conventional
161 metrics of political ability.

162 Interestingly, results are quite different when we turn to the subjective outcome measures (self
163 confidence in discernment and EPE), suggesting that there is a mismatch between teens' self-
164 perceived and actual digital literacy skills. Several factors are strongly predictive of *confidence*
165 *in* one's own discernment ability (column 4) and epistemic efficacy (column 5). In particular,
166 higher levels of political interest and all three measures of academic performance (grit, interest
167 in school, GPA) are consistently linked to self confidence in discernment and (to a lesser extent)
168 epistemic efficacy. This suggests false confidence on the part of highly politically knowledgeable
169 and academically high performing teens: they are more confident in their ability to recognize fake
170 news and feel more epistemologically efficacious, but in reality perform no better than their peers.
171 Interestingly, these same "high performers" do in fact perform better on conventional measures of
172 political sophistication, namely knowledge (column 2) and belief accuracy (column 3).

173 To further examine the problem of overconfidence, we plot actual and perceived fake news
174 discernment ability in Figure 3.⁹ The horizontal axis gives respondents' actual fake news discern-
175 ment ability as measured in our discernment tasks; the vertical axis gives their perceived ability,
176 which we measured pretreatment. The results are quite striking: approximately two-thirds of teens
177 overestimate their relative performance in fake news discernment. This overconfidence is large in
178 absolute terms (mean 15.6 percent, standard deviation 32.6 percent) and widespread across respon-
179 dents with different characteristics. In Appendix Table SM.2, we show that there are few significant
180 predictors of overconfidence. We find some suggestive evidence that more politically interested
181 teens are more overconfident. However, there is no evidence that overconfidence is associated with
182 sex, social media news consumption, academic performance, or political attitudes. We take these

⁹This plot is limited to control respondents who did not receive the digital literacy tips treatment described below.

results as further evidence that fake news discernment — and the overconfidence problem — is a widespread challenge among teens.

The effect of skills and motivations

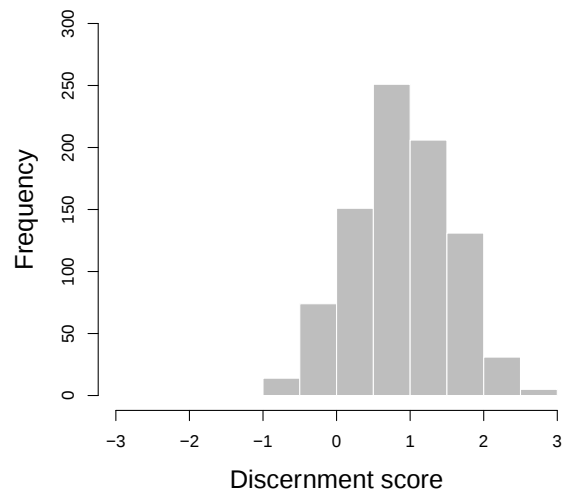
We test our experimental hypotheses with a series of preregistered OLS models. We present aggregate results in the main text and separate claim-specific models in Appendix A.

H1 predicted that the skills treatment will improve fake news discernment on average — that is, before taking motivation into account. We test this hypothesis by regressing our discernment outcomes on a dummy variable for the tips treatment among all respondents (i.e., including those who received a motivational prime and those who did not). Table 2 shows the results. Contrary to past research and our prediction, we fail to find evidence that the tips treatment improved overall discernment (column 1), increased belief in true claims (column 2), or decreased belief in false claims (column 3). In the Appendix, we show that these null effects are consistent across the different true and false stories included in our discernment tasks (see Appendix Tables SM.7 and SM.8).¹⁰ From these results, we conclude that our skills training, which has been found effective in other studies conducted on adults, is ineffective at improving digital literacy among adolescents. H1 is not supported.

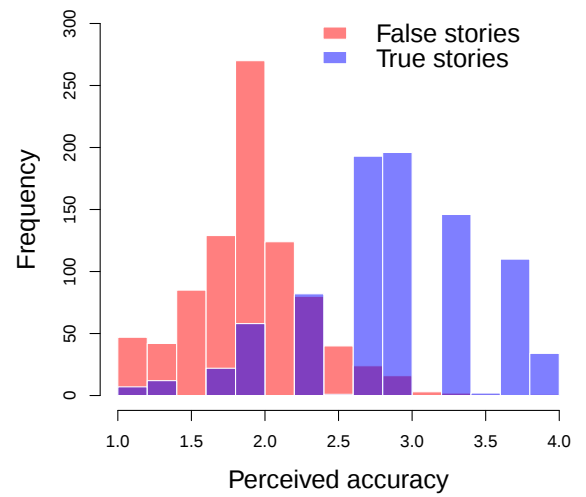
¹⁰Results are largely consistent across the different true claims, although individually underpowered. In the case of false claims, a story related to Palestine protests — a highly polarizing issue — seems to be to have the strongest reduction in erroneous belief. However, our overall results are not dependent on that claim.

Figure 2: Distribution of fake news discernment outcomes

(a) Discernment score

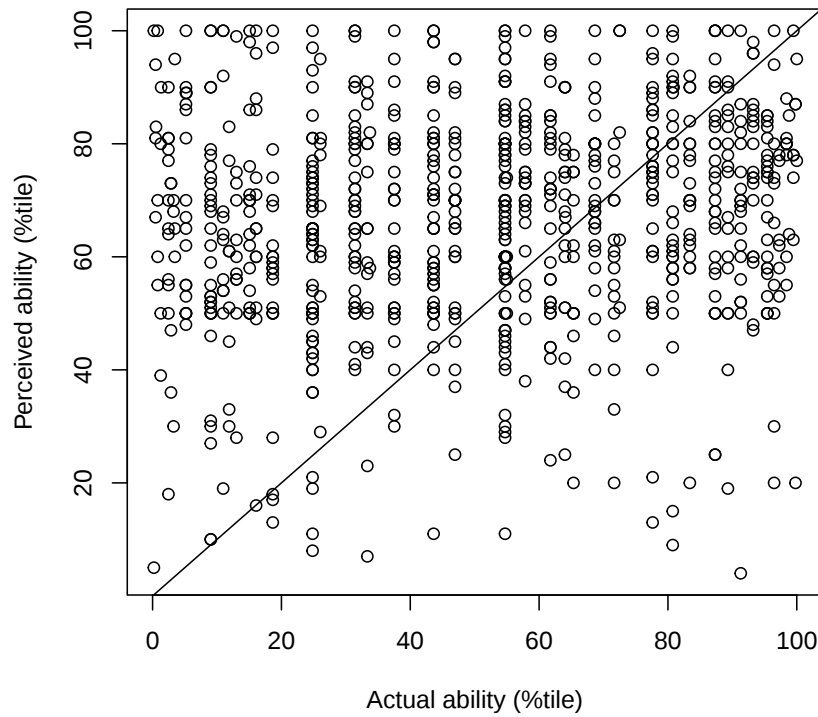


(b) Average accuracy ratings



Note: Sample includes control (no tips treatment) respondents only.

Figure 3: Actual vs. perceived fake news discernment ability



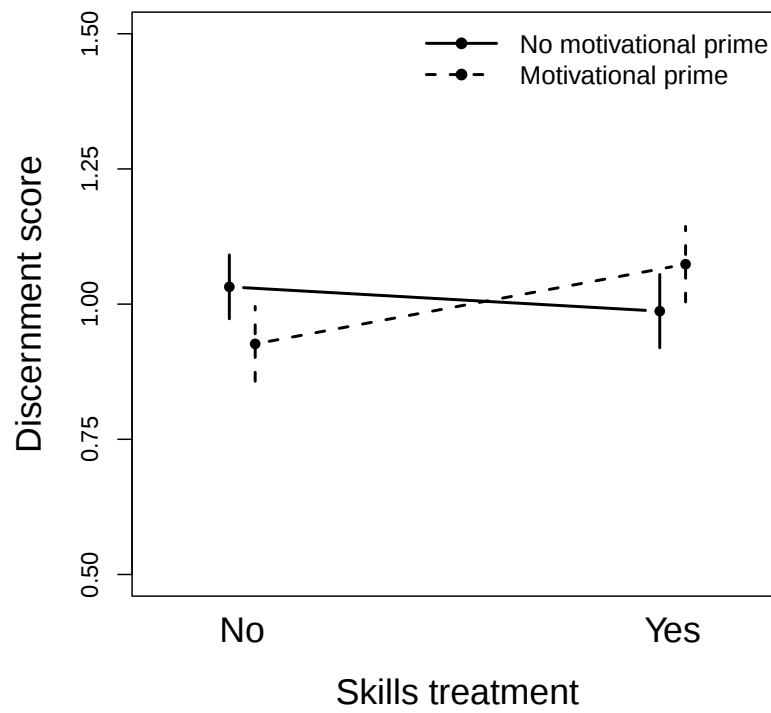
Note: Sample includes control (no tips treatment) respondents only. The x-axis is respondent's percentile in fake news discernment as measured in discernment tasks (described in text). The y-axis is respondent's perceived percentile as measured in the following survey question: "How do you think you compare with other Spaniards your age in your general ability to recognize 'fake news'? Please answer using the scale below, where 1 means you are at the bottom (worse than 99% of people) and 100 means you are at the top (better than 99% of people)." (Survey question taken from Lyons et al. [2021](#).)

199 These null average effects of skills training necessitate a careful interpretation of the results for
200 H2, which relates to the interaction of skills and motivations. H2 posits that the effect of skills
201 training on discernment would be larger for respondents who receive an individualized motivational
202 prime. We test this hypothesis with models that interact the tips and motivational prime treatments.

203 We present the H2 results visually in Figure 4, which displays mean discernment scores (with
204 95 percent confidence intervals) for different experimental conditions. Consistent with H2, we
205 see a significant interaction between our skills-enhancing and motivational treatments. Among
206 respondents who did not receive a motivational prime (solid black lines), skills training fails to
207 increase discernment. By contrast, among respondents who received a prime (dotted black line),
208 we observe significant gains in discernment ($p < .001$). This effect is sizeable, with an interaction
209 effect of .19 points (column 1), or an increase of about one-fifth of the average levels of discernment.
210 H2 is supported.

211 An interesting and unexpected finding is that motivational primes presented alone (i.e., without
212 skills training) decrease overall discernment ($p < .05$). This suggests that attempts by teachers
213 or others to raise awareness and concern about misinformation are likely counterproductive unless
214 accompanied with skills training. In fact, when the same primes are accompanied by skills training,
215 this negative effect is eliminated and we see significant gains in discernment. We view these results
216 as strong evidence that, consistent with our argument, skills and motivations are both important
217 determinants of digital literacy.

Figure 4: Effect of skills-enhancing treatment on fake news discernment



Note: Dots show mean discernment score by condition. Error bars contain 95% confidence intervals.

Disaggregating these overall effects, Table 3 examines the effect of our treatments on overall discernment (column 1) as well as belief in true and false claims (columns 2 and 3, respectively). Looking at columns 1 and 2, it becomes clear that the interactive effects in Figure 4 are driven by changes in the perceived accuracy of true claims. When motivational primes are presented alone, respondents demonstrate a pattern of false skepticism, reducing their belief in true claims, which then results in decreases in overall discernment. When both tips and motivational primes are provided, we see discernment improve relative to the motivation-only baseline — an effect that is again driven by increased belief in true claims. (In Appendix Figure SM.2 (panel A), we present differences in the distributions of discernment by treatment group, and in panels B and C for accuracy of true and false stories, respectively. Table SM.10 disaggregates effects by false claims.) However, it is worth noting that respondents who received both skills training and a motivational prime still do not outperform pure control respondents who received neither treatment. This is at least partially because skills training fails to decrease belief in false news — a point to which we return in the concluding discussion.

Finally, we examine H3, which posited that motivational primes will increase demand for digital literacy resources (measured by opting into any of three resources offered at the end of the experiment). The results are presented in Table 4. Contrary to our prediction, the overall effect of the motivational primes on demand for resources is negative and statistically significant (relative to baseline demand of just under one resource per respondent). To better understand this finding, we examine the separate effects of each individual motivational prime on demand in the bottom panel of Table 4. Here we see that the overall negative effect is driven by the in-group risk prime, which highlighted that teenagers spread and consume a disproportionate amount of misinformation. Exposure to this prime decreases demand for each of the three resources (although only significantly in the case of demand for a free course, $p < .05$), resulting in a significant overall reduction in demand. (We present the effects on demand visually in Figure SM.2 (panel D), which displays the distribution of the total demand outcome by experimental condition.) By contrast, exposure to the other two primes had null effects on demand.

In light of our experimental results, we conducted a series of exploratory extensions. Specifically, we examine heterogeneity by student performance and the motivational prime respondents received. We present the exploratory results in Appendix A and provide an overview here.

Heterogeneity by student performance

The descriptive analyses presented above reveal that adolescents who perform highly academically (as measured by interest in school, grit, and GPA) are more confident in their discernment ability and feel more epistemically efficacious. In reality, however, these individuals perform no better on fake news discernment than their less academically inclined peers (shown in Table 1). Prior experimental studies suggest that skills training may be particularly effective among low academically performing students, while findings in the education literature suggest that school performance is correlated with performance in new, unrelated skills outside the classroom (Van Iddekinge et al., 2024). We therefore looked into whether the experimental results presented above differ substantially across academically stronger and weaker adolescents.

We evaluate this possibility by testing for heterogeneous effects based on respondents' interest in school, grit, GPA, and political knowledge. We look for heterogeneous effects by rerunning our models for H1, H2, and H3 across subgroups; the results are presented in Tables SM.3-SM.5. We fail to find evidence that the effect of skills training alone varies across more or less academically inclined or politically interested adolescents. Although all these measures interact positively with the effects of the tips treatment, all effects are small and insignificant.

We do, however, find strong evidence that our key interactive effect — skills training and motivation — is driven by less gritty, less politically interested, and low GPA respondents (see Table SM.4). This suggests that motivational appeals are especially important among less academically inclined and politically interested adolescents.¹¹ One interpretation is that high academic performers may have been somewhat “pre-treated” in terms of motivation: they have high baseline motivation to

¹¹We show results separately by high- and low- levels of the potential moderators to facilitate interpretation, instead of interacting them with the treatments.

invest cognitive effort into analyzing political information, even *sans* motivational prime. These academic high performers are also likely high in need for cognition — a psychological disposition that captures individual differences in the tendency to engage in and enjoy deliberate thinking (Cacioppo & Petty, 1982) and which has been linked to academic motivation and cognitive capacity among adolescents (Kramer et al., 2021). By contrast, less academically inclined and politically interested adolescents are unlikely to invest effort into carefully evaluating political information unless motivated to do so. Receiving an individualized motivational prime provides this necessary push, which then leads them to apply their cognitive skills to interpret information.

With respect to demand for digital literacy resources (H3), we find no evidence of heterogeneity based on political interest or academic performance (see Table SM.5).

Heterogeneity by motivational prime

The theory we offered above focuses on how skills and motivations interact to shape digital literacy. However, we did not offer a comprehensive theory of which particular types of motivations are most effective in stimulating adolescents to apply their cognitive skills. Instead, in our experiment, we took a data-driven approach by designing three primes (informed by theory and previous work) and presenting treated respondents with the prime that most closely related to their own preexisting concerns about misinformation.

Here, we examine whether some of our motivational primes — which focused on public costs, private costs, and in-group risk — were more effective than others. Following our preregistration, we conduct manipulation checks to examine the extent to which our motivational primes increased agreement with a series of statements about the dangers of misinformation. We combine these statements into an overall index and analyze that variable. The results are presented in Appendix Table SM.6. As an initial note, it is important to recognize that baseline concern about the treats posed misinformation is quite high. Among untreated (no motivational prime) respondents, the average level of agreement is 4.12 on a 5-point scale. Despite the potential for ceiling effects, results demonstrate that receiving a motivational prime significantly increased agreement that mis-

information is dangerous ($p < .01$). Looking at the three primes separately, we see that the public threats and in-group risk primes significantly increased the perceived threat of misinformation ($p < .01$ for both). The in-group risk prime is particularly effective, increasing the perceived threat by 0.15 points ($p < .05$). However, the private threats prime, which focused on the personal costs of misinformation (e.g., consumer scams, fraud), failed to significantly increase agreement. In fact, this private threats prime failed to increase agreement with the most theoretically related statement in the index: that “misinformation is a threat to me personally.” This suggests that respondents who received the private threats prime were not treated as successfully as respondents who received the other two primes (public costs, in-group risk). As a result, the the effect of motivations is likely conservatively estimated in our data. Stronger or better targeted motivational treatments would make the interactive effect between skills and motivations even larger.¹²

We conducted a series of additional analyses to examine whether our experimental results involving motivations (H2 and H3) depend on which prime respondents received. We present the results in Appendix Tables [SM.11](#) and [SM.12](#). We find no evidence that the interactive effect of skills and motivations no discernment (H2) depends on the specific prime respondents received. Similarly, we fail to find evidence that the effects of motivations on demand (H3) demand on which prime respondents received.¹³

Discussion

Digital literacy is a major challenge among adolescents: although they spend more time online than other age cohorts, they often struggle to evaluate the reliability of content they encounter. Past research offers mixed conclusions about the effectiveness of adolescent digital literacy interventions, which have focused overwhelmingly on the development of new skills. To help explain these mixed findings, we have argued that adolescent digital literacy depends on the interaction of skills and

¹²Despite the failure of the private threats prime, we retain these respondents in the analyses to avoid post-treatment bias (Montgomery et al., 2018).

¹³Consequently, excluding these primes from the pooled treatment arm of all motivational primes does not change any of the effects of receiving a motivational prime we identified for H2 and H3.

motivations. Building on multidisciplinary theory and evidence, we argue that skills-enhancing interventions (such as tips and courses) improve digital literacy most when paired with motivational appeals that convince adolescents to invest effort into learning and applying those skills. We tested this argument with a national experiment in Spain that randomized skills training and exposure to an individualized motivational prime. We examined how these treatments affect fake news discernment and demand for additional digital literacy resources.

Experimental results suggest that, consistent with our argument, skills and motivations interact to shape fake news discernment among adolescents. (However, we find no such interaction when it comes to demand for digital literacy resources, which we discuss below.) While skills training is ineffective when delivered alone, training significantly improves discernment when paired with a motivational prime. It is important to note that the interventions tested here — an infographic with digital literacy tips and a single motivational prime — were minimally intrusive and offered in a single, relatively short survey session.¹⁴ We take this as strongly suggestive evidence that more intense treatments — such as multi-session in-class trainings and more vivid motivational appeals — would lead to larger improvements in discernment.

One notable finding is that the interactive effect of skills and motivation (H2) is driven by lowering the erroneous skepticism towards true claims induced by the motivational prime alone (recall Table 3, column 2). Highlighting the risks of misinformation alone (without providing skills) caused respondents to become more skeptical of true claims, worsening overall discernment.¹⁵ When skills training is provided alongside motivation, this false skepticism is reduced, resulting in a significant improvement in discernment. Importantly, our treatments did not affect the perceived reliability of false claims. This is a troubling result given high baseline levels of belief in fake news: 31% of the respondents in the pure control group (no skills or motivation treatment) in our sample rate the false claims to be somewhat reliable (average score greater than 2). This level of

¹⁴The median time spent on the whole survey in our sample is just over eight minutes. Those in the tips-only treatment group spent a median time of 43 more seconds on the survey than those in the pure control group.

¹⁵Similarly, past research on anti-misinformation interventions (e.g., fact-checking) among adults has documented unexpected spillover effects like these (see Carey et al. 2020 for an example and Guay et al. 2023 for discussion of the general problem).

belief in false claims is not reduced by the skills or motivation treatments, either alone or combined (Table 3). Future work should design and evaluate new approaches to improving recognition of false claims. Similarly, future research could consider more intensive, topic-specific training to improve knowledge about domains on which fake news is widespread (e.g., health).

Our two-pronged approach to improving fake news discernment is most beneficial for the least academically engaged students (as measured by GPA, grit, and interest in school). This finding is consistent with other work focusing on educational interventions designed to boost learning in conventional academic subjects, such as reduction of class sizes (Nye et al., 2000) or high-dosage tutoring programs (Guryan et al., 2023). However, this is not the case for other interventions, such as tracking (Card & Giuliano, 2016) or acceleration or grade-skipping (Steenbergen-Hu et al., 2016), which tend to benefit high-achieving students only. Importantly, our finding of heterogeneity by academic performance occurs despite the fact that the least academically engaged students are no different from the more academically engaged ones in terms of baseline levels of misinformation discernment (see Table 1). This suggests that fake news discernment is orthogonal to other academic skills and it is not simply that those who do least well initially have the most to gain from interventions.

The null effects of our treatments on demand for digital literacy resources highlight the challenge of increasing uptake of these resources in realistic settings where individuals have choice over what they consume (e.g., out of school). Of course, these null effects are limited to the specific resources that were on offer (a list of fact-checking sites, fake news discernment tips, and a free online course). One possibility is that the motivation and skills treatments may have interacted to shape demand in unexpected ways. Consistent with this explanation, we find some evidence that the effect of receiving a motivational prime on demand is heterogeneous (see Appendix Table SM.12): among respondents who did not receive the skills treatment, receiving a prime is positively associated with demand for the most popular resource offered (tips; see panel D of Appendix Figure SM.2). The overall null effects of motivational primes on demand are therefore driven exclusively by the subgroup who receive *both* the motivation and tips prime. One interpretation is that there may be

some substitution between receiving the skills treatment and demand for additional resources — that is, respondents who are motivated by our primes but already receive relevant resources may be disinclined to opt into additional resources. Given the very low intensity nature of the skills treatment, this suggests that stronger motivational primes may be necessary to highlight the usefulness of additional resources. We are confident that future research could identify compelling motivational primes along these lines (e.g., possible in multimedia formats or individually customized using AI).

Collectively, our results suggest that skills and motivations interact to shape perhaps the most important component of digital literacy: fake news discernment. This finding offers an important lesson for educators, policymakers, researchers, and others interested in developing effective digital literacy interventions aimed at adolescents. Whatever their format or mode of delivery, effective interventions must therefore strengthen not only adolescents’ skills but also their motivation to learn and apply them.

Methods

Our data come from a preregistered experiment using a national sample of adolescents (age 14–18) in Spain ($N = 1803$).¹⁶ The survey instrument and an anonymized version of the preregistration are provided in the Supplementary Materials. Respondents were recruited from a commercial panel (Netquest) in the spring of 2025 and resembled the national age cohort in terms of gender and region (autonomous community). Sample characteristics are provided in Appendix Table SM.1.

Descriptive measures

Our descriptive analyses (see Table 1) consider five outcome measures. They are measured as follows.

Fake news discernment: see below.

¹⁶This N includes respondents who reached the experimental portion of the survey (“Motivational treatment” in Figure 5).

Political knowledge is measured as the number of correct answers to five questions about contemporary politics in Spain.

Belief accuracy is measured with a battery of ten questions about non-politicized current affairs issues (e.g. “ham is the biggest export product in Spain”). We subtract the number of false beliefs from the number of correct beliefs (normalized by the number of true and false beliefs).

Self confidence in discernment is measured using one question adapted from Lyons et al. 2021: “How do you think you compare to other Spaniards your age in your overall ability to recognize fake news? Answer using the scale below, where 1 means you’re in the worst place (worse than 99% of people) and 100 means you’re in the best place (better than 99% of people).”

Epistemic efficacy is measured as average level of agreement (from 1–5) to the following three statements: “I am confident that I can discover the truth about political issues”; “If I wanted to, I could find out the facts behind most political disputes”; “Behind most political disputes there are objective facts, and if you try hard enough you can find them.” This scale is taken from Pingree (2011).

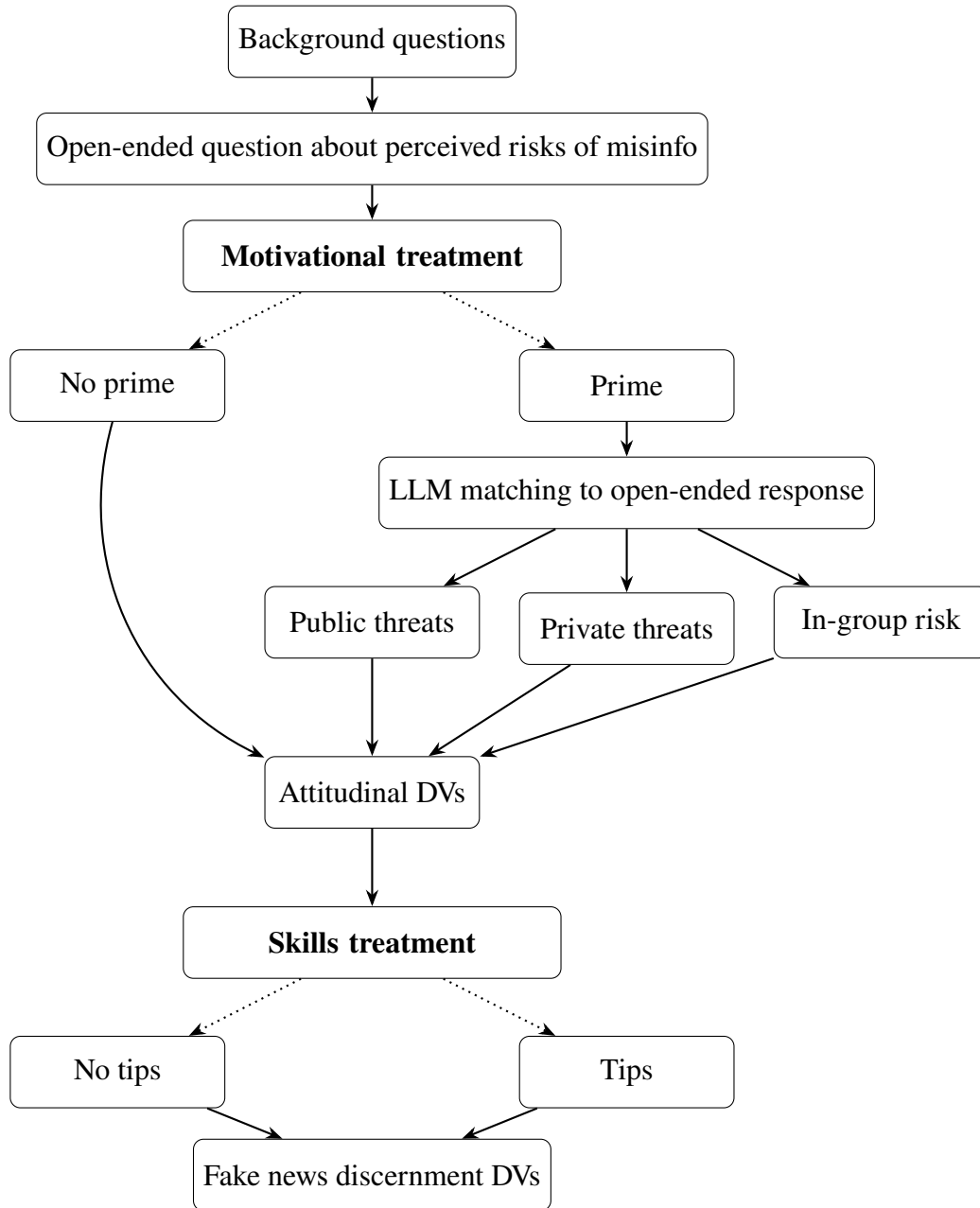
Experimental design and analysis

Figure 5 illustrates the experimental design. Respondents began the survey by answering a set of standard background, demographic, and political questions. Respondents then answered an open-ended question about the potential risks of misinformation.¹⁷ We use responses to this question in one of our randomized treatments, described below.

Randomization occurred in two stages. First, respondents were randomly assigned to receive a motivational prime or not. For those assigned to receive a prime, we used the large language model ChatGPT–4.0 to analyze their response to the open-ended question and estimate three similarity scores. These scores capture the extent to which their open-ended response discusses the social costs of misinformation, private costs of misinformation, or the role of adolescents in spreading

¹⁷The question wording was, “There is a lot of talk these days about disinformation, or ‘fake news.’ What do you think are the main risks or dangers posed by fake news? (Answer in at least 100 characters).”

Figure 5: Experimental design



Note: Dotted lines indicate random assignment.

416 and consuming misinformation, respectively.¹⁸ We presented treated respondents with the prime

¹⁸For the first similarity score (public costs), the prompt used was: “Does this text address the consequences of misinformation on macro-level social and political outcomes, such as democracy, elections, governance, and public health? Calculate a score from 0 to 100 that captures the extent to which the text addresses these macro-level social and political consequences of misinformation (where 0 = not at all and 100 = a lot). Make sure to provide only one

corresponding to their highest similarity score. The goal was to present each treated respondent with a motivational prime that will resonate with a pre-existing concern about misinformation.

We designed the three motivational primes based on literature discussed above, which has found that extrinsic motivational appeals can spur costly behavioral change. All three primes were formatted as a short news blurb that summarized a fictional study from Oxford University (a salient, prestigious, but not familiar foreign university). The public threats prime cued the dangers of misinformation for democracy; the private threats prime discussed dangers specific to teenagers; and the in-group blame prime discussed the role of teenagers in spreading a disproportionate share of online misinformation. Pilot analysis on a national sample of Spaniards showed that all three primes increased the perceived dangers of misinformation.

All respondents — whether they received a motivational prime or not — then answered a series of attitudinal questions, which included agreement with various statements that misinformation is dangerous and demand for additional digital literacy resources. The demand question asked, “This concludes this part of the survey. At the end of the survey, would you like to receive more information about any of the following? (Click in as many as you wish)” (with options being tips to identify fake news, a list of non-partisan fact-checking sites in Spain, free online digital literacy course). We use the agreement questions as manipulation checks to verify the success of the motivational primes. We use the demand outcomes to test H3.

Second, we randomized exposure to an infographic providing tips on fake news discernment. Following Guess et al. (2020), we rely on a series of tips originally designed by Facebook (2025). We created a shortened and translated version of Facebook’s original tips, which we thought more suitable to Spanish teenagers while continuing to be low cost as well. The infographic provides a series of short tips for spotting fake news, including being skeptical of all caps headlines, checking sources, inspecting dates, and checking claims against other reports. The infographic is displayed in Appendix Figure SM.1. Past research has found that this and similar tips-based treatments improve fake news discernment. Respondents could spend as much or as little time as they wanted on this

numerical value between 0 and 100. Do not include any additional text or words.” The other two prompts took the same format.

screen.

In the final stage of the survey, respondents complete fake news detection tasks, which we use to test H1 and H2. Respondents were asked to rate the accuracy of nine news stories or social media posts — six false and three true — that were circulating online at the time of data collection (spring 2025). Some news stories were attributed to major national outlets, others were unattributed, and some were screenshots from social media posts. Our goal was to mimic the diversity of the information environment teenagers may encounter (Twenge et al., 2019).¹⁹ Figure 1 in the main text provides an example of one true and one false story used in the experiments. While no nine stories can represent the entire universe of online content, we chose stories that varied in terms of topical focus, format, source, and tone (for a similar approach, see Guess et al. 2020). Respondents were shown the stories in random order and asked to evaluate the reliability of each on a 4-point unipolar scale from “not at all reliable” to “totally reliable,” with no limits on the time the subjects could dedicate to checking or the resources available to them.

Following Guay et al. (2023), we operationalize *fake news discernment* as the difference between a respondent’s average rating of true and false stories, respectively. The resulting variable ranges from –3 to 3 with higher values corresponding to better discernment. For our descriptive analysis of discernment, we restrict the sample to control respondents who did not receive the fake news tips treatment described above.

¹⁹Although a systematic analysis of treatment effects by different attributes of news is beyond the scope of this paper, we provide in the Appendix all results by each of the news pieces.

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Table 1: Predicting actual and perceived political skills (normalized OLS models)

	<i>Objective measures</i>			<i>Subjective measures</i>	
	(1) Fake news discernment	(2) Political knowledge	(3) Belief accuracy	(4) Self confidence in discernment	(5) Epistemic efficacy
Female	−0.04*** (0.01)	−0.01* (0.004)	−0.02 (0.01)	−0.02 (0.01)	−0.02** (0.01)
Not very interested in pol.	−0.03 (0.02)	0.02*** (0.01)	0.06*** (0.01)	0.05*** (0.01)	0.01 (0.01)
Pretty interested in pol.	0.002 (0.02)	0.03*** (0.01)	0.10*** (0.01)	0.09*** (0.01)	0.03* (0.01)
Very interested in pol.	−0.02 (0.03)	0.05*** (0.01)	0.13*** (0.02)	0.17*** (0.02)	0.05*** (0.02)
Social media news user	−0.03 (0.03)	−0.09*** (0.01)	−0.17*** (0.02)	−0.07*** (0.02)	0.10*** (0.02)
Grit	−0.02 (0.05)	0.05 (0.03)	0.03 (0.01)	0.13*** (0.03)	0.05* (0.03)
Interest in school	0.04 (0.04)	0.05* (0.02)	0.02 (0.01)	0.10*** (0.02)	−0.02 (0.02)
GPA	−0.03 (0.02)	0.05** (0.02)	0.04*** (0.01)	0.04* (0.02)	−0.02 (0.01)
Left-wing	0.02 (0.02)	0.01 (0.01)	−0.01 (0.01)	−0.05*** (0.01)	0.02* (0.01)
Right-wing	0.01 (0.02)	−0.003 (0.01)	−0.01 (0.01)	0.02 (0.01)	0.02* (0.01)
Sumar (far left) voter	0.01 (0.04)	0.02* (0.01)	0.02 (0.02)	−0.01 (0.02)	0.03 (0.02)
PSOE (center-left) voter	0.03 (0.02)	−0.001 (0.01)	0.04** (0.01)	0.05*** (0.01)	0.02* (0.01)
PP (center-right) voter	0.02 (0.02)	−0.01 (0.01)	0.04* (0.02)	0.01 (0.02)	−0.003 (0.01)
Vox (far right) voter	−0.01 (0.02)	−0.01 (0.01)	0.05*** (0.01)	−0.004 (0.01)	0.01 (0.01)
Constant	0.60*** (0.09)	0.60*** (0.02)	0.54*** (0.04)	0.72*** (0.04)	0.47*** (0.04)
Mean on original scale	0.98 (0.68)	2.78 (1.19)	0.49 (0.68)	7.23 (2.33)	3.21 (0.81)
Preregistered controls	✓	✓	✓	✓	✓
Sample	Controls (no tips)	All	All	All	All
N	798	2827	2783	2891	2807

Note: Top panel shows OLS coefficients with standard errors in parentheses, with all outcomes normalized to 0–1. Column 1 includes only control (no tips treatment) respondents; Columns 2–5 include all respondents, including incompletes who answered pre-experimental questions but did not reach the discernment tasks. Bottom panel shows means and standard deviations (in parentheses) for each outcome variable on its original scale as described in the text. Preregistered controls (omitted) include age and educational status. Significance levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

Table 2: Effect of skills-based treatment on fake news discernment (H1)

	<i>Dependent variable:</i>		
	(1) Overall discernment	(2) Belief in true claims	(3) Belief in false claims
Tips treatment	0.05 (0.03)	0.06 (0.03)	0.002 (0.02)
Constant	0.98*** (0.02)	2.90*** (0.02)	1.92*** (0.01)
N	1506	1506	1508

Note: Cell entries are OLS coefficients with clustered standard errors in parentheses. Significance levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

Table 3: Claim-specific interactive effects of skills-based and motivational treatments on fake news discernment (H2)

	<i>Dependent variable:</i>		
	(1) Overall discernment	(2) Belief in true claims	(3) Belief in false claims
Tips treatment	−0.04 (0.05)	−0.01 (0.04)	0.02 (0.03)
Motivational prime	−0.11* (0.04)	−0.09* (0.04)	0.01 (0.03)
Tips × motivation	0.19** (0.07)	0.14* (0.06)	−0.04 (0.04)
Constant	1.03*** (0.03)	2.94*** (0.03)	1.92*** (0.02)
N	1506	1506	1508

Note: Cell entries are OLS coefficients with clustered standard errors in parentheses. Significance levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

Table 4: Effect of motivational prime on demand for digital literacy resources (H3)

	<i>Dependent variable:</i>			
	(1) Total demand	(2) Demand: DL tips	(3) Demand: list of FCs	(4) Demand: free course
Any motivational prime (pooled effect)	−0.13*** (0.04)	−0.05* (0.02)	−0.04* (0.02)	−0.04* (0.02)
Public risk prime	−0.02 (0.05)	0.001 (0.03)	0.01 (0.02)	−0.02 (0.02)
Private risk prime	0.03 (0.06)	0.07 (0.04)	−0.04 (0.03)	0.01 (0.03)
In-group risk prime	−0.15* (0.07)	−0.02 (0.05)	−0.05 (0.04)	−0.08* (0.03)
Constant	0.90*** (0.03)	0.51*** (0.02)	0.21*** (0.01)	0.17*** (0.01)
N	1697	1697	1697	1697

Note: Total demand is the number of resources demanded (maximum value is 3). Cell entries are OLS coefficients with clustered standard errors in parentheses. Significance levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

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Figure SM.1: Digital literacy skills treatment (translated)

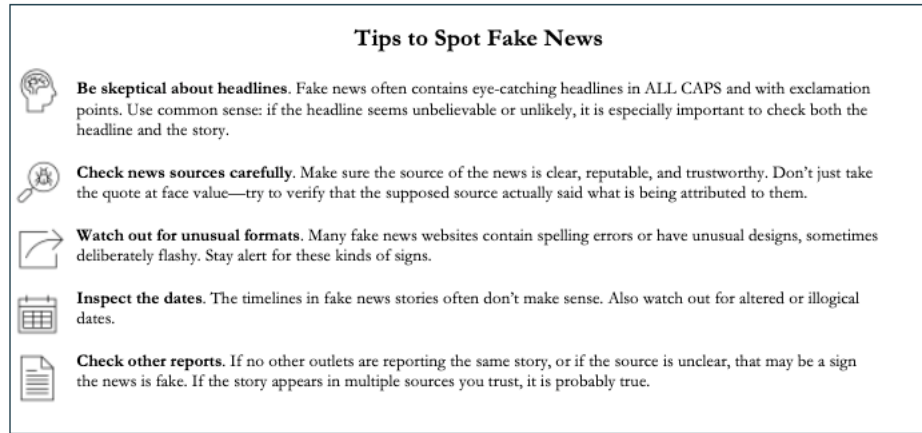
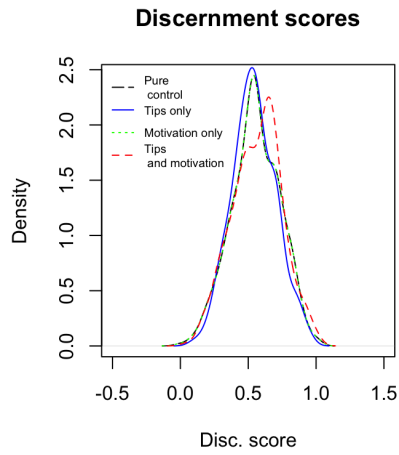
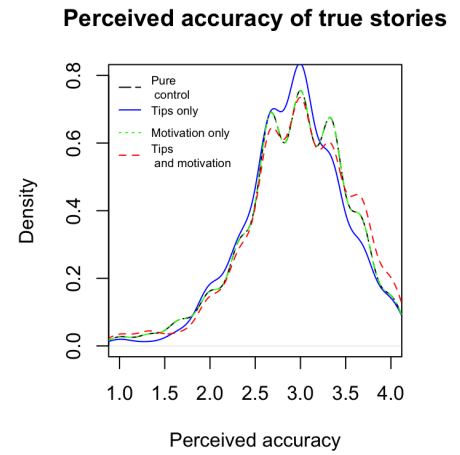


Figure SM.2: Distribution of outcome variables by treatment group

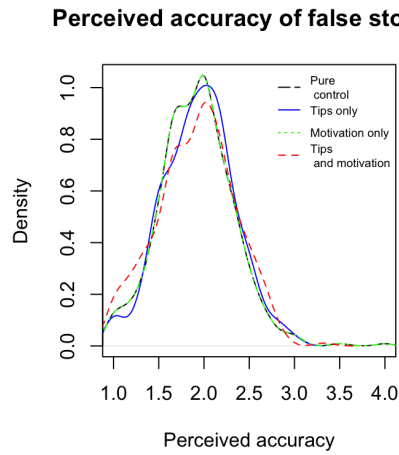
(a) Discernment score



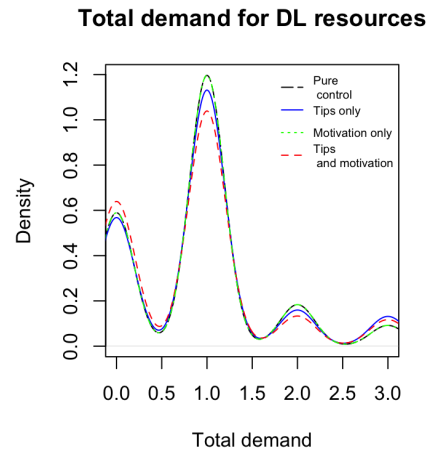
(b) Perceived accuracy of true news stories



(c) Perceived accuracy of false news stories



(d) Total demand for digital literacy resources



Note: Pure control is the treatment arm that receives neither tips nor motivation primes. In (D), total demand for digital literacy resources is the discrete count of the number of resources demanded out of three offered.

Table SM.1: Sample characteristics

Commercial panel	Netquest
Field dates	10 March - 5 May 2025
Sample size	1803
Age	min - 14 mean - 17.6 max - 18
Sex	female - 58.8% male - 40.6%
Educational status	not enrolled - 2.6% mandatory secondary - 21.3% vocational - 26.9% bachillerato - 33.5% university - 15.7%
Political ideology (1–10)	mean - 5.18

Note: Sample size includes respondents who reached the experimental portion of the survey (“motivational treatment” in Figure 4).

Table SM.2: OLS models predicting overconfidence in discernment ability

	(1) Is overconfident	(2) Percent overconfident
Female	0.001 (0.04)	0.92 (2.53)
Not very interested in pol.	0.04 (0.05)	6.56* (3.23)
Pretty interested in pol.	0.05 (0.05)	6.29 (3.76)
Very interested in pol.	0.11 (0.07)	12.23* (4.74)
Social media news use	-0.02 (0.01)	0.35 (0.95)
Grit	0.05 (0.03)	3.81 (1.95)
Interest in school	-0.01 (0.02)	-0.03 (1.62)
GPA	0.06* (0.03)	4.05 (2.21)
Left-wing	-0.03 (0.05)	-3.05 (3.15)
Right-wing	0.02 (0.05)	1.28 (3.28)
Sumar (far left) supporter	-0.09 (0.09)	-4.60 (6.32)
PSOE (center left) supporter	-0.07 (0.05)	-2.43 (3.66)
PP (center right) supporter	-0.13 (0.06)	-6.41 (4.50)
Vox (far right) supporter	-0.06 (0.05)	-2.11 (3.61)
Constant	0.05 (0.45)	-25.96 (31.18)
Preregistered controls	✓	✓
Sample	Controls (no tips)	Controls (no tips)
N	782	782

Note: Cell entries are OLS coefficients with clustered standard errors in parentheses. Preregistered controls include age and educational status. Significance levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

Table SM.3: Effects of skills treatment on discernment by subgroup

	(1)	(2)	(3)	(4)	(5)
Tips treatment	0.05 (0.03)	0.03 (0.10)	0.18 (0.18)	0.19 (0.16)	−0.05 (0.07)
Pol. knowledge		0.06** (0.02)			
Tips × Pol. knowledge		0.01 (0.03)			
Grit			0.002 (0.04)		
Tips × Grit			−0.04 (0.06)		
Interest in pol.				0.04 (0.03)	
Tips × Interest in pol.				−0.04 (0.04)	
GPA					−0.03 (0.04)
Tips × GPA					0.10 (0.06)
Observations	1,506	1,478	1,505	1,505	1,506
R ²	0.001	0.01	0.002	0.003	0.003
<i>Note:</i>		*p<0.05; **p<0.01; ***p<0.001			

Table SM.4: Effects of skills and motivation treatment on discernment by subgroup

	High Grit	Low Grit	High Interest	Low Interest	High GPA	Low GPA
Tips treatment	0.002 (0.065)	-0.096 (0.074)	-0.001 (0.072)	-0.082 (0.067)	0.037 (0.071)	-0.108 (0.067)
Motivational prime	-0.049 (0.060)	-0.166** (0.067)	0.019 (0.065)	-0.221*** (0.062)	-0.111* (0.065)	-0.096 (0.062)
Tips $\times$ Motivation	0.073 (0.091)	0.321*** (0.104)	0.085 (0.100)	0.295*** (0.095)	0.178* (0.099)	0.200** (0.095)
Constant	0.986*** (0.040)	1.081*** (0.046)	0.983*** (0.045)	1.073*** (0.041)	1.003*** (0.045)	1.052*** (0.041)
Observations	778	727	707	798	662	844
R ²	0.002	0.016	0.004	0.019	0.016	0.005

Note: Divides low- and high- levels of each moderator at their median sample value. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table SM.5: Effect of motivational prime on total demand for resources, by subgroup

	(1)	(2)	(3)	(4)	(5)
Motivational prime	-0.128*** (0.036)	-0.197 (0.109)	-0.248 (0.191)	-0.084 (0.170)	-0.178* (0.075)
Know score		0.009 (0.024)			
Motivational prime $\times$ Know score		0.023 (0.033)			
Grit score			0.039 (0.042)		
Motivational prime $\times$ Grit score			0.038 (0.058)		
Interest in politics				0.078* (0.033)	
Motivational prime $\times$ Interest in politics				-0.012 (0.046)	
GPA score					-0.058 (0.048)
Motivational prime $\times$ GPA score					0.053 (0.068)
Constant	0.896*** (0.026)	0.871*** (0.077)	0.768*** (0.139)	0.614*** (0.121)	0.952*** (0.053)
Observations	1803	1762	1802	1802	1802
R ²	0.007	0.008	0.009	0.012	0.011

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table SM.6: Manipulation checks: effects of each motivational prime on perceived threats

	(1) Threat index	(2) Threat to me personally	(3) Threat to democracy	(4) Misinfo dangerous	(5) Misinfo serious problem
Motivational prime (any)	0.10** (0.03)	0.08 (0.05)	0.09 (0.05)	0.12** (0.04)	0.10* (0.04)
Constant	4.12*** (0.02)	3.70*** (0.03)	4.08*** (0.03)	4.49*** (0.03)	4.22*** (0.03)
N	1,652	1,644	1,647	1,640	1,648
Public threats prime	0.11** (0.04)	0.12* (0.06)	0.16** (0.05)	0.11* (0.05)	0.07 (0.05)
N	1,312	1,304	1,307	1,303	1,308
Private threats prime	0.04 (0.05)	-0.04 (0.07)	0.02 (0.07)	0.11 (0.06)	0.08 (0.06)
N	1,118	1,111	1,113	1,109	1,115
In-group threats prime	0.15* (0.07)	0.18 (0.10)	-0.05 (0.09)	0.21* (0.08)	0.26** (0.08)
N	1,010	1,003	1,005	1,004	1,007

Note: Cell entries are OLS coefficients with clustered standard errors in parentheses. Each panel presents results from different regressions, all with the untreated group as the comparison group (so constant is the same across regression and not shown beyond the first set of regressions). Significance levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

Table SM.7: Effect of skills-based training on belief in true claims

	(1) Pooled	(2) Agricultural protests	(3) Narco deaths	(4) Goat rescued
Tips treatment	0.06 (0.03)	0.04 (0.04)	0.10* (0.04)	0.03 (0.04)
Constant	2.90*** (0.02)	2.56*** (0.03)	3.09*** (0.03)	3.06*** (0.03)
N	1506	1502	1499	1502

Note: Cell entries are OLS coefficients with standard errors in parentheses. Pooled model is the same as reported in Table 1. Significance levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

Table SM.8: Effect of skills-based training on belief in false claims

	(1) Pooled	(2) Catalan amnesty	(3) Palestine protesters	(4) Climate lockdowns	(5) Vaccines/ autism	(6) Immigrant housing	(7) Official complaints
Tips treatment	0.002 (0.02)	-0.02 (0.03)	-0.09* (0.04)	0.03 (0.04)	0.07 (0.04)	0.04 (0.05)	0.01 (0.04)
Constant	1.92*** (0.01)	1.40*** (0.02)	1.64*** (0.03)	2.39*** (0.03)	1.82*** (0.03)	2.32*** (0.03)	1.93*** (0.02)
N	1508	1500	1502	1501	1498	1503	1500

Note: Cell entries are OLS coefficients with standard errors in parentheses. Pooled model is the same as reported in Table 1. Significance levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

Table SM.9: Effects of skills-based and motivational treatments on belief in true claims (H2)

	(1) Pooled (all T claims)	(2) Agricultural protests	(3) Narco deaths	(4) Goat rescue
Tips treatment	−0.01 (0.04)	−0.04 (0.06)	0.04 (0.06)	−0.03 (0.06)
Motivational prime	−0.09* (0.04)	−0.05 (0.06)	−0.11* (0.05)	−0.09 (0.06)
Tips × prime	0.14* (0.06)	0.16 (0.09)	0.13 (0.08)	0.12 (0.09)
Constant	2.94*** (0.03)	2.58*** (0.04)	3.14*** (0.04)	3.10*** (0.04)
N	1506	1502	1499	1502

Note: Cell entries are OLS coefficients with clustered standard errors in parentheses. Significance levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

Table SM.10: Effects of skills-based and motivational treatments on belief in false claims (H2)

	(1) Pooled (all F claims)	(2) Catalan amnesty	(3) Palestine protesters	(4) Climate lockdowns	(5) Vaccines/ autism	(6) Immigrant housing	(7) Official complaints
Tips treatment	0.02 (0.03)	0.04 (0.04)	-0.10 (0.06)	0.07 (0.06)	0.08 (0.06)	0.03 (0.07)	0.06 (0.05)
Motivational prime	0.01 (0.03)	0.10* (0.04)	-0.05 (0.05)	0.07 (0.06)	-0.02 (0.05)	-0.03 (0.06)	0.04 (0.05)
Tips × prime	-0.04 (0.04)	-0.13* (0.06)	0.03 (0.08)	-0.09 (0.08)	-0.02 (0.08)	0.02 (0.09)	-0.11 (0.07)
Constant	1.92*** (0.02)	1.36*** (0.03)	1.67*** (0.04)	2.36*** (0.04)	1.83*** (0.04)	2.33*** (0.04)	1.92*** (0.03)
N	1508	1500	1502	1501	1498	1503	1500

Note: Cell entries are OLS coefficients with clustered standard errors in parentheses. Significance levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

Table SM.11: Tips and motivation treatments on discernment scores

	(1)	(2)	(3)	(4)
	Any prime	Public prime	Private prime	In group prime
Tips	−0.04 (0.05)	−0.04 (0.05)	−0.04 (0.05)	−0.04 (0.05)
Motivation treatment	−0.11* (0.05)	−0.09 (0.06)	−0.14* (0.07)	−0.08 (0.10)
Tips × Motivation	0.19** (0.07)	0.19* (0.08)	0.17 (0.10)	0.23 (0.14)
Constant	1.03*** (0.03)	1.03*** (0.03)	1.03*** (0.03)	1.03*** (0.03)
Observations	1,506	1,171	983	878
R^2	0.01	0.01	0.00	0.00

Notes: Clustered standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table SM.12: Effect of motivational prime on demand for digital literacy resources, among those with no exposure to skills treatment (H3)

	(1) Total demand	(2) Demand: DL tips	(3) Demand: list of FCs	(4) Demand: free course
Any motivational prime (pooled effects)	0.06 (0.05)	0.10** (0.03)	-0.03 (0.03)	-0.02 (0.03)
Public risk prime	0.10 (0.06)	0.08 (0.04)	0.02 (0.03)	0.005 (0.03)
Private risk prime	0.04 (0.08)	0.14** (0.05)	-0.07 (0.04)	-0.02 (0.04)
In-group risk prime	-0.06 (0.10)	0.13 (0.07)	-0.10 (0.06)	-0.09 (0.05)
Constant	0.90*** (0.03)	0.51*** (0.02)	0.21*** (0.01)	0.17*** (0.01)
N	1697	1697	1697	1697

Note: Total demand is the number of resources demanded (maximum value is 3). Cell entries are OLS coefficients with clustered standard errors in parentheses. Significance levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

Online Supplementary Materials B: Discernment tasks

This appendix displays the news items used to measure fake news discernment. As described in the main text, respondents evaluated nine news items (three true and six false) in random order.

On the following pages, we will show you a series of posts that have recently appeared online. Naturally, some online content is more reliable than others. We are interested in knowing how reliable you find each piece of content.

— page break —

[Note: order of the following 9 posts is randomized with a page break after each]

La Guardia Civil bloquea a los tractores y les impide circular por la A-3

Los agricultores valencianos colapsan las carreteras para reivindicar sus derechos



Circulación por la A-3 este martes 6 de febrero.

How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[True story - from

<https://www.lasprovincias.es/valencia-ciudad/guardia-civil-bloquea-tractores-impide-circular-20240206090305-nt.html?ref=https%3A%2F%2Fwww.lasprovincias.es%2Fvalencia-ciudad%2Fguardia-civil-bloquea-tractores-impide-circular-20240206090305-nt.html>]

— page break —

CÁDIZ

Muere un narcotraficante durante una persecución de la Guardia Civil a una narcolancha en la desembocadura del Guadalquivir

Es el segundo fallecido en febrero, ya que el pasado día 7 una colisión en aguas de Tarifa entre una patrullera de la Guardia Civil y una embarcación de recreo que transportaba fardos de hachís también se saldó con la muerte de uno de los tripulantes



La patrullera de la Guardia Civil Río Tíetar, en una imagen en otra actuación.

Otra persecución a una narcolancha en el Estrecho acaba con un traficante muerto y otro herido

Marlaska saca pecho en la cumbre europea contra el crimen organizado en Cádiz: Los narcos están "acorralados"

CHEMA RODRÍGUEZ | SEVILLA

18/02/2025 10:10

How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[True story - from

<https://www.elmundo.es/andalucia/2025/02/18/67b44e7621efa087518b4598.html>]

— page break —

SUCESOS INSÓLITOS >

Rescatada una cabra de la ventana de un quinto piso en Madrid: “Ya está, lista, la tenemos”

La Policía Municipal busca ahora al dueño del animal, ya que en el inmueble del distrito de Villaverde donde estaba “hace tiempo que no vive nadie” y ningún vecino sabe ni de quién es ni cómo llegó hasta allí



La cabra, que ha resultado ser un macho adulto de cabra enana, en el poyete de la ventana.
Video: BOMBEROS MADRID

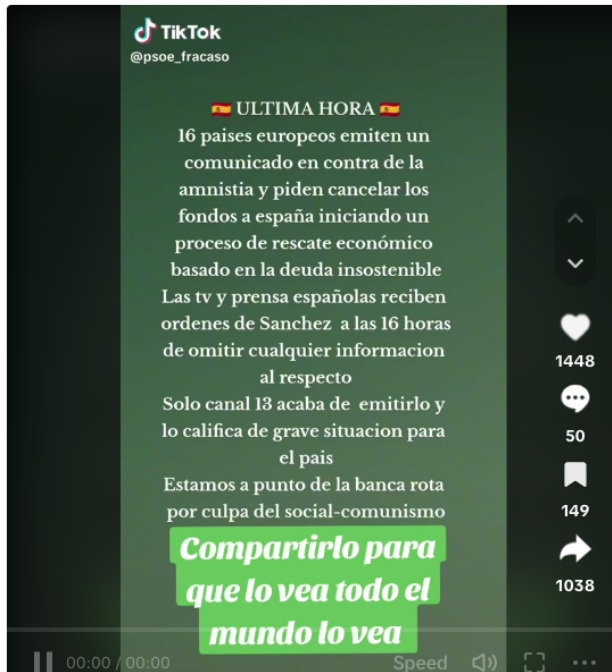
How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[True story - from

<https://elpais.com/espana/madrid/2025-02-19/rescatada-una-cabra-de-la-ventana-de-un-qui-nto-piso-en-el-distrito-madrileno-de-villaverde.html>]

— page break —



How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[False claim - reported by Maldita (Spain) -

<https://maldita.es/malditobulo/20250922/comunicado-paises-europeos-amnistia-cortar-fondos-Espana/>]

— page break —



How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[False claim - reported by Deutsche Welle (Germany) -

<https://www.dw.com/en/fact-check-misleading-visuals-of-rafah-offensive-circulate-on-social-media/a-69217380>]

— page break —

Hija de Klaus Schwab: 'Vienen bloqueos climáticos permanentes, te guste o no'

hecho verificado

30 de julio de 2023 · Sean Adl Tabatabai · Noticias, EE. UU. · 8 comentarios



How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[False claim - reported by Delfi (Lithuania) -

<https://www.delfi.lt/en/lie-detector/has-klaus-schwab-s-daughter-threatened-with-permanent-climate-restrictions-96211951>]

— page break —



Cuidado con la "vacuna de la bronquiolitis" si esta noticia se confirma, el precio a pagar por bajar hospitalizados (la mayoría leves) sería terrible.
[Translate post](#)

Científicos franceses advierten que los recién nacidos que reciben vacunas contra el VSR están cayendo muertos

Hecho verificado

🕒 5 de enero de 2024 👤 Sean Adl Tabatabai
💬 7 comentarios



How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[False claim - reported by Maldita (Spain) -

<https://maldita.es/malditobulo/20240503/bulo-mortalidad-vacuna-vrs-nirsevimab/>]

— page break —

En Cataluña, los musulmanes procedentes de Marruecos viven en un 80% de las ayudas sociales y siete mil ni siquiera residen en España

How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[False claim - reported by El Diario (Spain) -

https://www.eldiario.es/desalambre/cifras-contexto-confundirnos-comunidad-musulmana_1112563.html]

— page break —



Ely ❤️💛💜
@Ely12598176

...

Y después de toda esta parafernalia. ¿Que se le va a hacer al Juez prevaricador que admite a trámite algo que en el artículo 262 dice q es ilegal?, a este Juez ¿quien le sanciona? Los dioses de la injusticia 🙄

[Translate post](#)

En España, el artículo 262 de la Ley de Enjuiciamiento Criminal establece que "las noticias periodísticas no podrán servir de base para iniciar un procedimiento de oficio". Esto significa que las autoridades no pueden abrir una investigación basándose únicamente en lo que se ha publicado en la prensa.

How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[False claim - reported by Maldita (Spain) -

<https://maldita.es/malditobulo/20240426/ley-enjuiciamiento-criminal-publicaciones-periodisticas/>]

Supplementary Information for
“Skills and motivation jointly shape digital literacy
among adolescents”

10 September 2026

Preregistration



Skills or motivation? Experimental evidence on the determinants of digital literacy among European youth

Public registration

Updates



Metadata

Study Information



Hypotheses

H1: Exposure to digital literacy tips will improve fake news discernment.

H2: Exposure to a motivational prime will increase the effectiveness of digital literacy tips.

H3: Exposure to a motivational prime will increase voluntary uptake of digital literacy resources.

We also offer the following research questions, which we plan to explore but do not have a directional prediction:

RQ1: What are the predictors of fake news discernment among teens?

RQ2: Are teens overconfident in their ability to discern fake news?

RQ3: What risks do teens perceive to fake news?

Design Plan

Study type

Experiment - A researcher randomly assigns treatments to study subjects, this includes field or lab experiments. This is also known as an intervention experiment and includes randomized controlled trials.

Blinding

For studies that involve human subjects, they will not know the treatment group to which they have been assigned.

Is there any additional blinding in this study?

Respondents will be fully blind as to treatment status

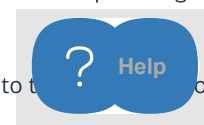
Study design

The experiment randomizes the following two factors. The result is a 2 (tips/no tips) x 2 (prime/no prime) design.

(1) Exposure to a set of digital literacy tips. These tips were originally designed by Facebook (see <https://www.facebook.com/help/188118808357379>) and have been used in previous digital literacy experiments (Guess et al. 2020). We created a condensed version of the tips, which we thought more suitable to 14-18 year olds. See instrument for full wording.

(2) Exposure to one of three motivational primes that accentuate the risks posed by misinformation or the benefits of digital literacy to teens. These primes were developed by the authors based on prior findings and theory. The three primes highlight the public costs of misinformation (e.g., to democracy), private costs of misinformation (e.g., scams/bogus products), and role of teens in spreading misinformation, respectively. See instrument for full wording of these primes.

Respondents who are assigned to receive a motivational prime will be shown the prime that most closely relates to the following pre-treatment question:



There has been a lot of debate about disinformation, or “fake news,” lately. What do you think about the dangers of fake news? What are the main negative consequences that could result from it?

Responses to this question will be text analyzed via ChatGPT-4.0 (embedded into our Qualtrics survey flow). ChatGPT will create three scores, which capture the relevance of the open-ended response to each of the three primes; these scores are stored as embedded data in Qualtrics. Qualtrics will then present each treated respondent with the prime that corresponds to their highest score. (If there is no highest score, the respondent will be randomly assigned to one of the three primes.) For purposes of analysis, we will collapse all three primes into a single “prime” treatment dummy.

Below we have attached the Qualtrics survey flow, which illustrates the experimental design and other survey features.

- [instrument.pdf](#)
- [survey-flow.pdf](#)

Randomization

See “Study design” above

Sampling Plan

Existing Data

Registration prior to creation of data

Explanation of existing data

No response

Data collection procedures

We will recruit a sample of 14-18 years old Spanish residents via the Netquest commercial panel. The sample will resemble the target population in terms of gender and region (autonomous community). Respondents will be compensated via Netquest for their participation. We collect informed consent on the first page of the survey (see instrument). Data collection will begin during the week of Monday, 10 March 2025 (following a soft launch of approximately n=50 to verify survey is working). The survey will close when the target sample size is reached.

No files selected

Sample size

1500 respondents. (Final sample size may slightly exceed 1500 depending on when Netquest closes the study to their panelists)

Sample size rationale

Maximum sample size possible under study budget

Stopping rule

No response

Variables

Manipulated variables

See “Study design”

No files selected

Measured variables

-Fake news discernment:

We measure the perceived accuracy of each story with the following question:

How accurate is this story?



- Totally accurate [4]
- Very accurate [3]
- Not very accurate [2]
- Not at all accurate [1]

Following Guay et al. (2023), we use responses to these questions to calculate an overall fake news discernment score: (perceived accuracy of true stories) - (perceived accuracy rating of false stories).

-Uptake of digital literacy resources:

Number of boxes checked in response to the following question (range 0-3):

This concludes this part of the survey. At the end of it, would you like to receive more information about any of the following topics? (Click on all that you want)

Tips for identifying "fake news"

A list of non-partisan "fact-checking" sites in Spain

A free digital literacy course

No files selected

Indices

No response

No files selected

Analysis Plan

Statistical models

We will estimate the following OLS models (in pseudo-R code), with standard errors clustered at the respondent level:

H1: Exposure to digital literacy tips will improve fake news discernment.

`lm(discernment ~ tips)`

H1 is supported if the coefficient on "tips" is positive and significant at $p < .05$.

H2: Exposure to a motivational prime will increase the effectiveness of digital literacy tips.

`lm(discernment ~ tips + prime + tips*prime)`

H2 is supported if the coefficient on the interaction term is positive and significant at $p < .05$.

H3: Exposure to a motivational prime will increase voluntary uptake of digital literacy resources.

`lm(uptake ~ prime)`

H3 is supported if the coefficient on prime is positive and significant at $p < .05$.

For H1 and H2, "tips" is a dummy that takes 1 if assigned to the tips treatment, 0 otherwise.

For H2 and H3, "prime" is a dummy that takes 1 if assigned to one of the three primes, 0 otherwise (see "Study design").

**

See "Measured variables" for a description of DV measurement.

No files selected

Transformations

No response



Inference criteria*No response***Data exclusion**

Respondents who fail a pre-treatment attention check will be excluded.

Missing data

Listwise deletion

Exploratory analysis

**** Research questions ****

RQ1: What are the predictors of fake news discernment among teens?

$\text{lm}(\text{discernment} \sim \text{as.factor}(\text{age}) + \text{female} + \text{as.factor}(\text{edu status}) + \text{as.factor}(\text{political interest}) + \text{ideo_left} + \text{ideo_right} + \text{as.factor}(\text{party vote}) + \text{as.factor}(\text{social media use}))$

Age ranges from 14-18; educational status is not enrolled (reference), mandatory secondary education, vocational education, or bachillerato; political interest ranges from 1-4; ideo_left is a dummy that takes 1 if respondent self-places from 1-4 on the 10-point ideological scale; ideo_right is a dummy that takes 1 if respondent self-places from 7-10 on the same scale (moderates treated as reference group); we will code party vote as dummy variables corresponding to a vote for one of the big 4 parties (PP, PSOE, Sumar, Vox) with other response options collapsed and treated as reference group; social media use is the average frequency of social media use for news consumption across the following platforms: Tiktok, Instagram, Facebook, X/Twitter, Snapchat (range 1-7).

RQ2: Are teens overconfident in their ability to discern fake news?

We will calculate each respondent's percentile in the fake news discernment outcome variable (call that "objective percentile"). We will create a plot showing objective percentile compared to subjective percentiles, which we measure with the following pre-treatment question:

How do you think you compare to other Spaniards your age in your overall ability to recognize fake news? Answer using the scale below, where 1 means you are in the worst place (worse than 99% of people) and 100 means you are in the best place (better than 99% of people).

This measure and approach was taken from Lyons et al. (2021).

RQ3: What risks do teens perceive to fake news?

We will conduct exploratory sentiment analysis on responses to the following pre-treatment question:

There has been a lot of debate about disinformation, or "fake news," lately. What do you think about the dangers of fake news? What are the main negative consequences that could result from it?

**** Manipulation check ****

If H2 or H3 is not supported, we will conduct the following manipulation check to examine whether the motivational primes increased the perceived threat of misinformation.

$\text{lm}(\text{perceived threat} \sim \text{prime})$

Where "perceived threat" is average level of agreement (measured 1-5) with the following statements:

Disinformation is a threat that affects me personally.
 Disinformation is a threat to democracy in Spain.
 Disinformation is dangerous.
 Disinformation is a serious policy problem.

If the coefficient on prime is positive and significant at $p < .05$, then the manipulation was successful.



**** Notes ****

-Following Guay et al. (2023), we will examine what is driving the overall discernment results by estimating separate models predicting perceived accuracy of true stories and false stories. These stories are:

*False: 16 countries oppose Catalan amnesty; manipulated images out of Palestine; permanent climate lockdowns; vaccines killing infants; immigrant social housing in Catalunya; press reports can't be used as basis for investigation.

*True: police blocking agricultural protesters; drug trafficker killed in police pursuit; goat rescued from balcony in Madrid.

The full text of all stories is included in the attached instrument.

-We will compute and report summary statistics for our sample.

-The order of hypotheses and research questions (and corresponding analyses) in the final manuscript may be altered for expositional clarity.

-Regression results will be verified for robustness using appropriate GLM estimators (ordered logit for the discernment outcome; Poisson or negative binomial for the uptake outcome).

Other

Other

Funding: This project is supported by a Social Research Grant [REDACTED]

References

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A.M. Guess, M. Lerner, B. Lyons, J.M. Montgomery, B. Nyhan, J. Reifler, & N. Sircar. A digital media literacy intervention increases discernment between mainstream and false news in the United States and India. *Proc. Natl. Acad. Sci. U.S.A.* 117 (27) 15536-15545, <https://doi.org/10.1073/pnas.1920498117> (2020).

B.A. Lyons, J.M. Montgomery, A.M. Guess, B. Nyhan, & J. Reifler. Overconfidence in news judgments is associated with false news susceptibility, *Proc. Natl. Acad. Sci. U.S.A.* 118 (23) e2019527118, <https://doi.org/10.1073/pnas.2019527118> (2021).

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Survey instrument (translated)

This study is led by [REDACTED] and [REDACTED] from [REDACTED] in [REDACTED]. The goal of the study is to understand public opinion about some of the political topics and figures that have been in the news recently. The data you provide by participating in the study will be completely anonymous. You may leave at any time by clicking “exit” at the top of your browser. This survey is part of a nonpartisan academic project. This survey is not associated with any candidate, political party, or other political organization. We will not process any data that could identify you, either on its own or in combination with additional information. Your participation is voluntary, and you may withdraw your consent at any time or for any reason.

I confirm that I have read the above information about my participation in this survey.

-Yes

-No

I understand that my participation is voluntary and that I may leave at any time.

-Yes

-No

I agree to participate in this study.

-Yes

-No

[Filter out if answered “No” to any of the above]

— page break —

[Demographics]

In this first part of the survey, we will ask you some questions about yourself.

Are you of Spanish nationality?

-Yes

-No

Which autonomous community do you currently live in? [drop-down menu]

-Andalusia

-Aragon

-Canary Islands

-Cantabria

-Castile-La Mancha

-Castile and León

-Catalonia

-Community of Madrid

-Chartered Community of Navarre

-Valencian Community

-Extremadura

-Galicia

-Balearic Islands

- La Rioja
- Basque Country or Euskadi
- Principality of Asturias
- Region of Murcia

How old are you? [text entry]

What is your sex?

- Female
- Male
- Other []

Are you currently enrolled in formal education? Which?

- Yes, I am enrolled in Compulsory Secondary Education (ESO)
- Yes, I am enrolled in Bachillerato (Upper Secondary Education)
- Yes, I am enrolled in Vocational Training: Basic Level
- Yes, I am enrolled in Vocational Training: Intermediate Level
- Yes, I am enrolled in Vocational Training: Advanced Level
- No, I am not enrolled in formal education
- Other (please describe your situation) [text entry]

— page break —

In general, from 1 to 5, how much do you agree or disagree with the following statements?

I like going to my school.

I like the classes I am taking.

I learn in the classes I am taking.

I think I learn from my teachers.

The education I receive is important for my future.

Schoolwork is a waste of time.

- 1 - Strongly disagree
- 2
- 3
- 4
- 5 - Strongly agree

Last year I received the following grades. Please select all that apply.

- Outstanding
- Very good
- Good
- Pass
- Fail

My favorite subject is:

- Math
- Language
- History
- Physics and Chemistry
- Biology and Geology
- Technology
- Physical Education
- Art
- Other []

[Grit scale]

Select one answer for each of the following items. Don't think too much about the questions.

New ideas and projects sometimes distract me from previous ones.

Setbacks don't discourage me. I don't give up easily.

I often set a goal but then change my mind and decide to pursue a different one.

I am a very hard worker.

I have difficulty maintaining focus on projects that take more than a few months to complete.

I finish everything I start.

My interests change from year to year.

I am diligent. I never give up.

I have been obsessed with a certain idea or project for a short time, but then lost interest.

I have overcome setbacks to achieve an important goal.

-Not like me at all

-Not much like me

-Like me

-Very much like me

-Exactly like me

— page break —

How interested are you in politics?

-Not interested at all

-A little interested

-Fairly interested

-Very interested

When talking about politics, people often use the terms left and right. Where do you place yourself? Please use the following scale from 1 to 10, where 1 means left and 10 means right. Which number best describes your position?

[horizontal]

1 - LEFT

2

3

4

5
6
7
8
9
10 - RIGHT

--- page break ---

Imagine that national elections were held tomorrow and you were old enough to vote. Which party would you vote for?

-PSOE
-PP
-Sumar
-VOX
-Other party [which?]
-Null vote
-Blank vote
-Would not vote
-Don't know yet

[trust in institutions]

We will name a series of institutions. Using a scale from 0 to 10, where 0 means "no trust at all" and 10 means "maximum trust," please tell us how much trust you currently have in each of them.

Scientists
Journalists
The judicial system
The Government of Spain
Political parties
Fact-checkers
The media
The European Union

-0 – No trust at all
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10 - Maximum trust

[conspiracism]

Do you agree or disagree with the following statement?

Important events, such as wars, the current economic slowdown, and election results, are controlled by small groups of people secretly working against us.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

--- page break ---

[Epistemic political efficacy; measures taken from Pingree 2011 -
<https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1460-2466.2010.01525.x>]

Do you agree or disagree with the following statements?

I am confident that I can find out the truth about political issues.
If I wanted to, I could find out the facts behind most political disputes.
Behind most political disputes there are objective facts, and if one tries hard enough, they can be found.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

— page break —

[Confidence in news judgments; measures taken from Lyons et al. 2021 -
<https://www.pnas.org/doi/10.1073/pnas.2019527118#supplementary-materials>

How confident are you in your own ability to recognize false news ('fake news')?

- 0 - No confidence at all
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 - Maximum confidence

How confident are you in people your age to recognize false news ('fake news')?

- 0 – No confidence at all
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 - Maximum confidence

How do you think you compare with other Spaniards your age in your general ability to recognize false news ('fake news')? Please answer using the scale below, where 1 means you are at the bottom (worse than 99% of people) and 100 means you are at the top (better than 99% of people).

1 ----- 100

— page break —

Do you have an account on any of the following social networks? Please select all that apply.

- Tiktok
- Instagram
- Facebook
- X/Twitter
- Snapchat

How often do you use the following sources to look for political news?

Tiktok
Instagram
Facebook
X/Twitter
Snapchat
Media outlets (newspapers, radio, etc.)

- More than once a day
- Once a day
- Once every few days
- Once a week
- Once a month
- Less than once a month
- Never

--- page break ---

Now we would like to ask you some questions about politics and government.

Can you tell me who is the president of VOX?

- Santiago Abascal
- Javier Ortega Smith
- Rocío Monasterio
- Iván Espinosa de los Monteros

Of the following groups of people, who has the right to vote in general elections (for the Congress of Deputies and the Senate)?

- All adults residing in Spain
- Adults who pay taxes in Spain
- All people legally residing in Spain
- People with Spanish nationality

Do you know who was the first Prime Minister after the transition?

- Carlos Arias Navarro
- Adolfo Suárez
- Leopoldo Calvo-Sotelo
- Felipe González

In what year was the Spanish Constitution approved?

- 1966
- 1970
- 1978
- 1989

Is the PSOE currently governing with an absolute majority?

- Yes
- No
- Don't know

— page break —

[Module: baseline misperceptions]

Please tell us how accurate you believe the following statements are.

[Programming note: these are presented as two separate blocks of questions, with block order randomized and question order within blocks randomized]

Vaping is harmless to health.

The EU does not have the power to block laws passed by the Spanish parliament.

The value of Bitcoin is not backed by a national government.

Squatters cannot legally be removed from a property in Spain.

Climate change is influenced by human activity.

Ham is Spain's top export product.

During Franco's dictatorship, some people were imprisoned for their political ideology.

Spain has one of the highest youth unemployment rates in the EU.

Women can get pregnant when they have their period.

The average social media influencer earns millions of euros a year.

-Very accurate

-Somewhat accurate

-Not very accurate

-Not accurate at all

— page break —

[Attention check]

We are interested in knowing how often you do certain activities. Now, to make sure you are paying attention to the survey, please select the options "Several times a day" and "Never."

-Several times a day

-Once a day

-Several times a week

-Several times a month

-Never

[Screen out if fails to follow instructions]

— page break —

Nowadays there is a lot of talk about disinformation or "fake news." What do you think are the main risks or dangers arising from fake news? (Answer with a minimum of 100 characters)

--- page break ---

What cases of fake news or disinformation about Spanish politics have you faced or come across? Please write a few words describing one or two cases (minimum 20 characters)

Can you mention some examples of fake news or disinformation you have come across on other topics? For example, health, finance, international politics, history. Please write a few words describing one or two cases (minimum 20 characters)

— page break —

[Experimental treatments begin here]

[Random assignment: motivational prime (treated) or no prime (control). If randomly assigned to treatment, respondents will be shown the prime that is most similar to what they wrote above in response to the open-ended question above about perceived risks of disinformation.]

On the next page, we will show you an article that has appeared in the news lately. Please read it carefully before answering the questions that follow.

[Public threats of misinformation prime]

Oxford warns: disinformation poses a direct risk to democracy in Spain

A new research report from the University of Oxford warns about the dangers of disinformation for democracy in Spain, stating that the spread of false narratives can weaken trust in institutions, deepen social divisions, and affect national security. Based on academic research, the report highlights how disinformation erodes trust in democratic processes and fuels tensions between communities.

“The impact of disinformation goes beyond individual beliefs; it can destabilize societies, weaken democratic norms, and even be exploited by foreign actors,” the report states. Given these risks, experts urge the government to take measures to curb the spread of false information, strengthen media literacy, and work with digital platforms to reduce its impact.

[Private threats of misinformation prime]

Oxford warns: disinformation poses an especially acute risk for teenagers in Spain

A new research report from the University of Oxford warns that disinformation is not only a political problem but also a direct risk to Spanish teenagers, as it spreads false narratives that can deceive consumers, fuel conspiracy theories, and facilitate fraud. According to the report, based on academic studies, disinformation networks target teenagers in particular, as they are at a key stage in their emotional and cognitive development.

“Disinformation is not just about politics; it can have real consequences for the finances, health, and safety of teenagers,” said an expert cited in the report. Given these risks, analysts urge teenagers to better protect themselves through media literacy and by verifying information from reliable sources. The report also highlights the importance of public awareness campaigns and fact-checking initiatives to curb the spread of fake news.

[In-group blame/risk prime]

Oxford warns: teenagers share a disproportionate amount of disinformation in Spain

A new research report from the University of Oxford warns that disinformation is a social problem that poses a direct risk to teenagers in Spain, since they are the ones who share it uncontrollably on social networks. Teenagers often spread this disinformation among their

friends and digital communities, amplifying its reach.

“Young people are not only vulnerable to disinformation but also actively contribute to its spread by sharing unverified news,” said an expert cited in the report. In light of this situation, experts urge teenagers to take greater responsibility when consuming and sharing information on social media, fostering critical thinking and caring for their friends. The report also stresses the need for digital platforms to strengthen efforts to identify and stop the spread of misleading content driven by young users.

— page break —

To what extent do you agree or disagree with the following statements?

Disinformation is a threat that affects me personally.

Disinformation is a threat to democracy in Spain.

Disinformation is dangerous.

Disinformation is a serious regulatory problem.

-Strongly agree

-Agree

-Neither agree nor disagree

-Disagree

-Strongly disagree

Are you in favor of or against the following policies?

Criminal penalties for producing “fake news” (e.g., fines)

Criminal penalties for spreading “fake news” on social media

Social media platforms suspending accounts where “fake news” circulates

Mandatory digital literacy courses in public schools

Greater government control over content moderation by social media platforms

-Strongly in favor

-In favor

-Neither in favor nor against

-Against

-Strongly against

This concludes this part of the survey. At the end of it, would you like to receive more information about any of the following topics? (Click all that apply)

-Tips for identifying “fake news”

-A list of nonpartisan fact-checking sites in Spain

-A free digital literacy course

— page break —

[Random assignment: treatment (gets tips below) or control (gets nothing here)]

Here are some tips developed by experts to help users identify fake news. Please read the tips carefully.

Tips to Spot Fake News

-  **Be skeptical about headlines.** Fake news often contains eye-catching headlines in ALL CAPS and with exclamation points. Use common sense: if the headline seems unbelievable or unlikely, it is especially important to check both the headline and the story.
-  **Check news sources carefully.** Make sure the source of the news is clear, reputable, and trustworthy. Don't just take the quote at face value—try to verify that the supposed source actually said what is being attributed to them.
-  **Watch out for unusual formats.** Many fake news websites contain spelling errors or have unusual designs, sometimes deliberately flashy. Stay alert for these kinds of signs.
-  **Inspect the dates.** The timelines in fake news stories often don't make sense. Also watch out for altered or illogical dates.
-  **Check other reports.** If no other outlets are reporting the same story, or if the source is unclear, that may be a sign the news is fake. If the story appears in multiple sources you trust, it is probably true.

— page break —

On the following pages, we will show you a series of posts that have recently appeared online. Naturally, some online content is more reliable than others. We are interested in knowing how reliable you find each piece of content.

— page break —

[Note: order of the following 9 posts is randomized with a page break after each]

La Guardia Civil bloquea a los tractores y les impide circular por la A-3

Los agricultores valencianos colapsan las carreteras para reivindicar sus derechos



Circulación por la A-3 este martes 6 de febrero.

How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[True story - from

<https://www.lasprovincias.es/valencia-ciudad/guardia-civil-bloquea-tractores-impide-circular-20240206090305-nt.html?ref=https%3A%2F%2Fwww.lasprovincias.es%2Fvalencia-ciudad%2Fguardia-civil-bloquea-tractores-impide-circular-20240206090305-nt.html>]

— page break —

CÁDIZ

Muere un narcotraficante durante una persecución de la Guardia Civil a una narcolancha en la desembocadura del Guadalquivir

Es el segundo fallecido en febrero, ya que el pasado día 7 una colisión en aguas de Tarifa entre una patrullera de la Guardia Civil y una embarcación de recreo que transportaba fardos de hachís también se saldó con la muerte de uno de los tripulantes



La patrullera de la Guardia Civil Río Tíetar, en una imagen en otra actuación.

Otra persecución a una narcolancha en el Estrecho acaba con un traficante muerto y otro herido

Marlaska saca pecho en la cumbre europea contra el crimen organizado en Cádiz: Los narcos están "acorralados"

CHEMA RODRÍGUEZ | SEVILLA

18/02/2025 10:10

How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[True story - from

<https://www.elmundo.es/andalucia/2025/02/18/67b44e7621efa087518b4598.html>]

— page break —

SUCESOS INSÓLITOS >

Rescatada una cabra de la ventana de un quinto piso en Madrid: “Ya está, lista, la tenemos”

La Policía Municipal busca ahora al dueño del animal, ya que en el inmueble del distrito de Villaverde donde estaba “hace tiempo que no vive nadie” y ningún vecino sabe ni de quién es ni cómo llegó hasta allí



La cabra, que ha resultado ser un macho adulto de cabra enana, en el poyete de la ventana.
Video: BOMBEROS MADRID

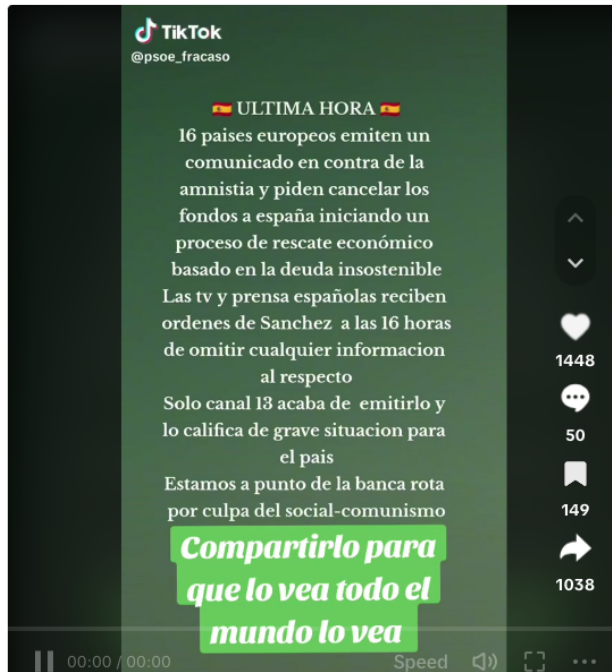
How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[True story - from

<https://elpais.com/espana/madrid/2025-02-19/rescatada-una-cabra-de-la-ventana-de-un-qui-nto-piso-en-el-distrito-madrileno-de-villaverde.html>]

— page break —



How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[False claim - reported by Maldita (Spain) -

<https://maldita.es/malditobulo/20250922/comunicado-paises-europeos-amnistia-cortar-fondos-Espana/>]

— page break —



How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[False claim - reported by Deutsche Welle (Germany) -

<https://www.dw.com/en/fact-check-misleading-visuals-of-rafah-offensive-circulate-on-social-media/a-69217380>]

— page break —

Hija de Klaus Schwab: 'Vienen bloqueos climáticos permanentes, te guste o no'

hecho verificado

30 de julio de 2023 · Sean Adl Tabatabai · Noticias, EE. UU. · 8 comentarios



How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[False claim - reported by Delfi (Lithuania) -

<https://www.delfi.lt/en/lie-detector/has-klaus-schwab-s-daughter-threatened-with-permanent-climate-restrictions-96211951>]

— page break —



Cuidado con la "vacuna de la bronquiolitis" si esta noticia se confirma, el precio a pagar por bajar hospitalizados (la mayoría leves) sería terrible.
[Translate post](#)

Científicos franceses advierten que los recién nacidos que reciben vacunas contra el VSR están cayendo muertos

Hecho verificado

5 de enero de 2024 Sean Adl Tabatabai
7 comentarios



How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[False claim - reported by Maldita (Spain) -

<https://maldita.es/malditobulo/20240503/bulo-mortalidad-vacuna-vrs-nirsevimab/>]

— page break —

En Cataluña, los musulmanes procedentes de Marruecos viven en un 80% de las ayudas sociales y siete mil ni siquiera residen en España

How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[False claim - reported by El Diario (Spain) -

https://www.eldiario.es/desalambre/cifras-contexto-confundirnos-comunidad-musulmana_1_1112563.html]

— page break —



Y después de toda esta parafernalia. ¿Que se le va a hacer al Juez prevaricador que admite a trámite algo que en el artículo 262 dice q es ilegal?, a este Juez ¿quien le sanciona? Los dioses de la injusticia 🤔

[Translate post](#)

En España, el artículo 262 de la Ley de Enjuiciamiento Criminal establece que "las noticias periodísticas no podrán servir de base para iniciar un procedimiento de oficio". Esto significa que las autoridades no pueden abrir una investigación basándose únicamente en lo que se ha publicado en la prensa.

How reliable is this post?

- Completely reliable
- Very reliable
- Not very reliable
- Not reliable at all

[False claim - reported by Maldita (Spain) -

<https://maldita.es/malditobulo/20240426/ley-enjuiciamiento-criminal-publicaciones-periodisticas/>]

— page break —

[Tips groups only:]

On the last page, you evaluated the accuracy of some factual statements. How useful were the “Tips for detecting fake news” during this task?

- Extremely useful
- Very useful
- Not very useful
- Not useful at all

— page break —

You said the “Tips for detecting fake news” were [response to previous Q] in helping you evaluate the statements. Why? How could they have been more useful? Write a few sentences. [open-ended]

— page break —

[debrief]

Thank you very much for participating in our survey. This is the last page of the survey. In the last few pages, we presented you with some news stories about Spanish politics and other topics. As part of this study, it was important for us to show you some fake news and some true ones. For this reason, some of the news items you read on the previous pages were false news that have circulated on the Internet.

For your information, the claims contained in the following posts are **FALSE**:

- FALSE**: 16 European countries have issued a statement against the amnesty in Catalonia and have asked the Union to cancel funds to Spain
- FALSE**: Palestinian actors are preparing fake images showing actors being made up after Israel's attack on Rafah on May 6
- FALSE**: Nicole Schwab, daughter of the founder of the IMF, says that “permanent climate lockdowns are coming”
- FALSE**: RSV vaccines are killing newborns
- FALSE**: Muslims from Morocco live on 80% of social aid in Catalonia
- FALSE**: Article 262 of the Criminal Procedure Law says that newspaper articles cannot serve as a basis to initiate a case ex officio

As you have seen, it is very important for teenagers like you to understand how to critically evaluate news. To help you with this, here are some resources you may want to check out (click to open in a new window):

- Tips for detecting “fake news”: “How to tell if a news story is fake” (European Parliament)
- A list of nonpartisan fact-checking sites in Spain: EFE Verifica, Info Veritas, Maldita.es, Newtral
- An online digital literacy course: “How to detect false information on the web” (MediaWise)

Do you have any questions or comments about this study? We are especially interested in any question you found confusing or unclear. [text entry]

Please click the button below to submit the survey and receive credit for it.