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Fake-News Perception vs. Fake-News Detection among university students A Case-Study on the abilities among students from Campus Heilbronn, Germany

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ABSTRACT

In the age of viral misinformation, the ability to recognize fake news is essential, particularly for university students who primarily consume news through social media. This study examines fake news detection abilities among German students from the campus in Heilbronn, focusing on three objectives: (1) assessing detection accuracy, (2) evaluating the gap between perceived and actual ability, and (3) identifying vulnerable demographic subgroups. Based on the GermanFakeNC corpus and a literature supported questionnaire design, 55 students assessed 12 headlines and rated their confidence. The average accuracy was 66.5%, falling short of the 75% benchmark. A weak but significant correlation ($r = .209$, $p < .001$) revealed widespread overconfidence. Gender differences were evident, with male students outperforming females in both fake news detection accuracy and self-assessment. Social media usage patterns did not show any significant impact. The findings emphasize the need for evidence-based media literacy training, particularly targeting overconfidence and subgroup disparities. This contributes to better preparedness for navigating the digital information landscape.

KEYWORDS: Confidence-Accuracy Gap, Fake-News Perception, Fake-News Detection, Fake News, Social Media, Media Literacy.

1. INTRODUCTION

Fake news, which can be broadly defined as intentionally false or misleading information presented in the format of legitimate news, has become an urgent challenge in the digital age (Allcott and Gentzkow 2017; Gelfert 2018). The rapid dissemination of fake news through social media platforms represents a growing threat to democratic societies and has been linked to misinformation cascades with significant societal impacts (Lazer et al. 2018; Vosoughi et al. 2018). University students are particularly affected and are exposed to greater risks, because of their intensive use of social media and their role as future participants in civic discourse (Orhan 2023).

To mitigate these risks, students need effective fake news detection abilities and if these abilities are not sufficiently present, universities have a reasonable educational mission in improving them. Previous studies have briefly examined whether students possess these abilities: In a study of undergraduates, Leeder (2019) found that students identify fake news about 65% of the time, while showing poor insight into their own abilities. Subsequent research has documented a pronounced Dunning-Kruger effect (Dunning and Kruger 1999): those least competent at spotting fabricated headlines often exhibit the greatest overconfidence, leading to greater susceptibility and willingness to share false content (Lyons et al. 2021; Yarchi et al. 2023). A recent scoping review of young people's interactions with misinformation confirmed that, despite high self- reported confidence, many struggle in practice, underscoring a critical gap between self-assessed and actual detection abilities (Kops et al. 2025). While these studies have created an indication of students' fake news detection abilities, they have largely focused on English and broadly sampled populations. Empirical data on German university students' fake-news detection performance and how it varies across demographic subgroups are currently lacking. And while German institutions such as these on the campus in Heilbronn have educational

measures in place to improve media literacy in students, with this data gap, it is impossible to assess whether these measures are sufficient and which demographic subgroups among students are especially vulnerable. This paper aims to close that gap specifically for students of the campus in Heilbronn, leading us to the following research question:

How accurately can Heilbronn students detect fake news, do they tend to overestimate or underestimate their abilities, and which demographic subgroups are most vulnerable?

The research question is addressed using a literature-supported questionnaire. There are three objectives of this study: Assess general fake news detection ability of Heilbronn students (1), determine their self-assessment regarding these abilities (2) and find out which demographic subgroups are particularly at risk (3).

The results of this study are intended to provide further insight into the current state of media literacy and it's training as well as the fake news detection abilities of students from Heilbronn, Germany. This paper is motivated by the need to inform German universities, about the state of German students' fake news detection abilities and media literacy, whether students are aware of their skill-level and which student subgroups are particularly at risk.

2. THEORERTICAL FOUNDATIONS

To place our study within the broader scholarship on fake news detection and self-assessment, we review four branches of fake news research: (1) conceptual definitions of fake news, (2) its social media dissemination, (3) empirical methods for measuring detection skill, and (4) self-assessment in real vs. fake judgments. We conclude by (5) highlighting the gap in the German university context and demographic subgroup information that motivates our hypotheses and methodology.

1.1. Conceptualizing Fake News

Scholars agree that fake news consists of deliberately false or misleading information presented in the format of traditional news, with the intent to deceive (Allcott and Gentzkow 2017; Gelfert 2018). Tandoc et al. (2018) further distinguish types of fake news by varying levels of factuality and deceptive intent. We narrow this definition down to fake news that pretends to be legitimate, since only this type can be used to test participants' evaluative abilities.

1.2. Dissemination via Social Media

The viral spread of fake news is amplified by algorithmic prioritization of engaging content and the low barrier of sharing on platforms such as Facebook, Twitter, and TikTok (Kozyreva et al. 2021; Chen et al. 2020). Lazer et al. (2018) and Vosoughi et al. (2018) demonstrate how misinformation cascades through social networks far faster than true information, often quicker than fact-checking efforts. University students' heavy reliance on social media for news makes them especially susceptible to exposure and belief in deceptive content.

1.3. Measuring Fake News Detection Abilities

Standard detection ability measurement studies present participants with a series of headlines, usually balanced between real and false, and ask them to classify each item (Maertens et al. 2024; Pennycook and Rand 2018). Accuracy rates in these tasks typically hover around 60-70% for undergraduate samples (Leeder 2019), well below expert benchmarks. The German Fake News Corpus (German FakeNC) (Vogel and Jiang 2019) provides a validated, German set of headlines that we adopt to ensure cultural and linguistic relevance.

1.4. Self-assessment abilities and the Dunning-Kruger Effect

Beyond raw accuracy, recent work examines the alignment (or misalignment) between confidence and correctness. Lyons et al. (2021) document a Dunning-Kruger effect (Dunning and Kruger 1999) in which the least accurate participants are often the most overconfident, contributing to greater misinformation sharing. Yarchi et al. (2023) replicate these findings in electoral contexts, and a scoping review by Kops et al. (2025) confirms persistent overestimation of detection abilities among young adults. Collectively, this research underscores the importance of pairing objective performance measures with confidence ratings to reveal self-assessment gaps.

3. METHODOLOGY AND CONCEPTUALISATION

1.5. Overview of methodology

Based on the literature-supported questionnaire research model outlined by Lindner (2020), the project proceeded in four stages: (1) literature review to establish the theoretical foundation, (2) development of the questionnaire, (3) distribution and data collection, and (4) analysis of the survey results. Figure 1 provides a visual overview of the four stages of the literature-supported questionnaire.

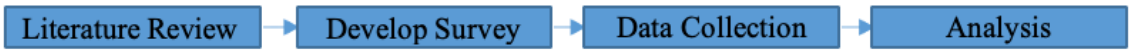

Figure 1: Research process based on Lindner (2020)

1.6. Hypothesis

While existing studies provide a robust framework, they have largely focused on English or internationally mixed samples. Empirical data on German university students remain scarce, hindering evaluation of existing media literacy initiatives at institutions in Germany. Also, current literature has not yet analysed how fake news detection abilities differ across demographic subgroups, showing which are most at risk. Without localized evidence, Heilbronn and German universities cannot determine whether its training programs sufficiently equip students to detect false information and which student groups to focus on. Derived from these gaps, we formulate three hypotheses:

- H1: Heilbronn students fake news detection abilities are "insufficient", meaning below a 75% accuracy threshold.
- H2: There is a significant gap between students' actual detection performance and their self-assessed confidence, indicating over- or under-estimation.
- H3: Heilbronn students' fake news detection abilities differ across demographic subgroups.

To test these, we employed a questionnaire modelled on Lindner's (2020) literature-supported questionnaire design, presenting 12 GermanFakeNC headlines (six real, six fake) for binary classification followed by 5-point Likert scale confidence ratings. Demographic items (age, gender, field of study, social media usage, political orientation) enable subgroup analyses. By combining a validated corpus (Vogel and Jiang 2019) with the headline-classification paradigm (Maertens et al. 2024) and self-assessment metrics (Lyons et al. 2021), our methodology aligns directly with prior research while filling the critical gap in the German context and among demographic subgroups.

1.7. Development of the Questionnaire

The hypotheses defined in section 2 form the basis of our questionnaire. H1 requires an objective measure of students' fake news detection abilities; a validated way to achieve this is to present participants with a series of headlines (real and fake ones) and ask them to classify each as real or fake (Maertens et al. 2023). Drawing on the GermanFakeNC corpus, which comprises 490 fact-checked false articles and 4500 verified real articles, we randomly selected 12 concise headlines, six false and six true (Vogel and Jiang 2019). For each headline, participants (a) choose if it is real or fake, and then (b) rate their confidence on a 5-point Likert scale from "Not at all confident" to "Extremely confident", which creates the data basis to test H2. Prior to the task, participants provide demographic information (age, gender, field of study, social media usage, political orientation) to enable subgroup analyses and testing of H3. The questionnaire was split up into the following three sections:

1. ***Demographic Information:*** This section gathers background information such as age, gender, field of study, and political orientation, allowing for subgroup analysis within the student population.
2. ***Media Usage:*** Participants report their typical media consumption behaviour, including preferred platforms (e.g., Instagram, TikTok, X) and their reliance on different media sources for news.
3. ***Evaluation of Fake News Detection Abilities and Self-Assessment:*** This section measures students' fake news detection abilities by presenting them with 12 real or fake news headlines. Following each headline, a self-assessment module asks participants to rate their real or fake judgement confidence on a 5-point Likert scale.

The online questionnaire was administered through LimeSurvey (2025), ensuring anonymity and ease of data export. Before full deployment, the survey was tested with 10 hand-selected students to refine question wording and usability.

1.8. Analysis of the Survey Results

All survey data was exported from LimeSurvey and imported into Python for cleaning, transformation, and analysis. Data analysis involved computing each participant's detection accuracy (the proportion of correctly classified headlines) and their mean confidence across all items. To test H1, overall correctness was benchmarked against our sufficiency threshold of 75%. To evaluate H2, we assessed whether survey participants mean confidence ratings significantly differed from their actual accuracy via Pearson's correlation coefficient. Finally, to test H3, subgroup analyses by gender, social media usage, and political orientation identified which demographic subgroups exhibited the largest gaps between accuracy and confidence.

4. RESULTS

- **Self-Assessment and Fake News detection ability**

In the following section, r denotes Pearson's correlation coefficient between participants' self- assessed confidence ratings and their correctness on headline judgments. The survey was conducted over the period of May 14th to June 25th, 2025. A total of 107 participants returned the survey, of which 55 fully completed the questionnaire and provided reasonable values and were retained for analysis. Each respondent was presented with 12 news headline items, yielding a maximum of 660 possible fake news judgments; 33 of these were skipped by participants, resulting in 627 analysable decisions. Across all 627 judgments, participants correctly identified real vs. fake headlines on 66.5% of trials (overall accuracy = 0.665). A breakdown of the judgement correctness by self-assessed confidence scale level can be found in Figure 2. The Pearson correlation between confidence and correctness was $r = 0.209$ ($p < 0.001$), indicating a statistically significant but weak relationship. Confidence therefore accounted for only about 4.4% of the variance in judgment accuracy ($r^2 = 0.044$).

Gender	**No. of participants**	**Judgement accuracy**	**r**	**p**
Male	28	0.75	0.241	0.000*
Female	23	0.56	0.116	0.062*
Platform			**r**	**p**
Instagram	42	0.67	0.111	0.432
TikTok	23	0.65	–0.015	0.915
X (Twitter)	13	0.70	0.117	0.408
Facebook	9	0.67	0.019	0.891
YouTube	35	0.69	0.207	0.140
LinkedIn	14	0.74	0.236	0.092
I don't use SoMe	4	0.75	0.129	0.362
Other	9	0.65	–0.025	0.858
Political Orientation			**r**	**p**
left	20	0.67	0.239	0.000*
political centre	13	0.73	0.271	0.001*
right	5	0.69	0.263	0.041*
non-political	6	0.62	0.204	0.063
Far left	3	0.56	0.010	0.949
far right	1	0.64	–0.213	0.506

Figure 2: Overview of survey results

- **Differences according to age, social media platform and political orientation**

Firstly, differences according to ***gender*** have been analysed. Of the 55 valid participants, 28 identified as male and 23 as female, while four participants chose not to provide their gender. Male participants achieved an overall accuracy of 0.75, with a Pearson correlation between confidence and correctness of $r = 0.241$ ($p < 0.001$), indicating a modest but statistically significant value. Female participants showed lower overall accuracy (0.56) and weaker calibration ($r = 0.116$, $p = 0.062$), which did not reach conventional significance.

To assess the self-assessment confidence according to gender an independent samples t-test has been performed as well, using the mean values of all self- assessed confidence values. Based on a calculated self-confidence mean the independent samples t-test showed a statistically significant difference between males (mean = 3.48) and females (mean = 2.88), $t(50) = 2.49$, $p = .016$. The mean difference was 0.61 at 95% confidence interval. The effect size was medium (Cohen's $d = 0.69$), indicating that males scored higher on average than females when self-reporting their own confidence.

Secondly, the usage of different ***social media platforms*** has been assessed, and the participants were grouped by regular usage (Yes or No) of Instagram, TikTok, Facebook, X, YouTube and LinkedIn. All platform-specific correlations between confidence and correctness were small ($r < 0.24$) and none reached significance at $p = 0.05$.

However, assessing the self-assessed confidence level, an independent-samples Welch's t-test indicated that the group of regular ***Instagram*** users (mean = 3.33, SD = 0.82, n = 42) scored higher than the group who does not regularly use Instagram, (mean = 2.47, SD = 1.36, n = 13), $t(14.79) = 2.18$, $p = .046$. The mean difference was 0.86 at 95% confidence level. The effect size was medium to large (Cohen's $d = 0.77$).

Moreover, an independent-samples Student's t-test showed that the group of regular ***YouTube*** users (mean = 3.45, SD = 0.82, n = 35) scored higher than the students who do not regularly use YouTube (mean = 2.56, SD = 1.11, n = 20), t (53) = 3.40, p = .001. The mean difference was 0.89 at a 95% confidence level. The effect size was large (Cohen's d = 0.95).

Thirdly, participants self-classified into six ***political orientation categories***. Political centre participants demonstrated the highest mean accuracy (0.73), while far left had the lowest (0.56). Significant calibration ($p < 0.05$) was observed for left, political centre and right oriented, but not for the other categories.

Moreover, the self-assessed confidence was tested using a one-way Welch's ANOVA and indicated that there was no statistically significant difference in the means between the groups (p = .272). This suggests that the political orientation does not have significant effect on the self-assessed confidence. Nonetheless, the frequency table provided in figure 3 provides an overview of the distribution of the self- assessed confidence per political orientation and their judgement accuracy.

Self- assessed Confidence level / political orientation	N	Mean	Median	SD	Min	Max	Judgement accuracy
on the left	20	3.19	3.33	0.743	1.41	4.58	0.67
political centre	13	3.50	3.50	0.636	2.33	4.75	0.73
on the right	6	3.40	3.70	13.25	1.25	4.91	0.69
far left	4	2.39	2.25	0.809	1.66	3.41	0.56
non-political	7	3.35	3.25	0.989	1.58	4.58	0.62
far right	1	2.75	2.75	/	2.75	2.75	0.64

Figure 3: Self- assessed confidence on Fake News detection and judgement accuracy acc. to political orientation

5. DISCUSSION

This study was set out to test whether Heilbronn students can accurately detect fake news (H1), their ability to accurately self-assess their confidence relative to performance (H2) and if there are meaningful differences in their abilities to detect fake news among different demographic subgroups (H3). The following paragraphs discuss the findings from the previous chapter critically based on these three hypotheses.

- **Overall Detection Abilities (H1)**

The overall accuracy of 66.5% is significantly above the statistical chance level of 50%, yet it remains well below the predetermined proficiency benchmark of 75%. ***This result confirms H1: Heilbronn students' fake news detection abilities are insufficient when measured against a 75% accuracy threshold.*** The findings are consistent with prior research showing that undergraduate students in comparable headline classification tasks typically achieve between 60% and 70% correct responses (Leeder 2019; Maertens et al. 2024). Figure 4 summarises the proportion of correct judgements by self-assessed confidence.

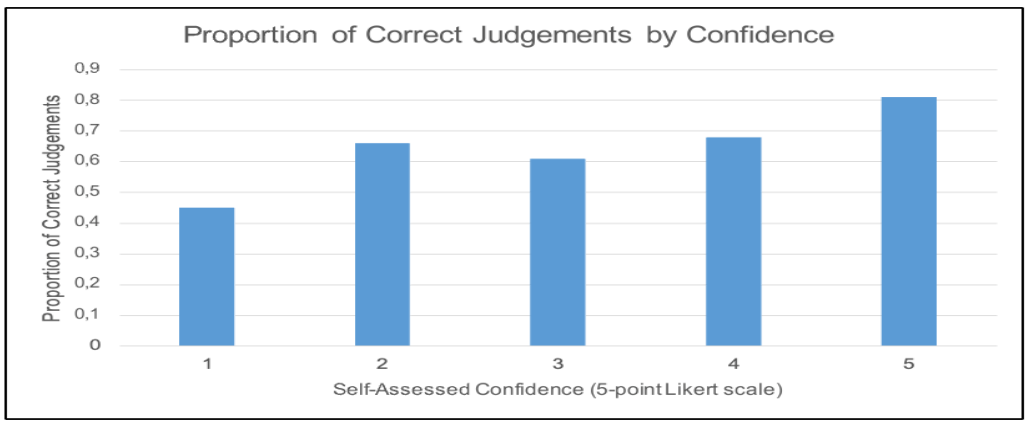

Figure 4: Percentage of correct news-item judgements by self-assessed confidence level

The social media setting rewards speed, continuous attention shifts, and low friction sharing. Under these conditions, users economize on verification, prioritize gist, and anchor on prior exposure. Repetition increases perceived truth, while social endorsement signals increase perceived reliability. These dynamics create a predictable gap between what feels credible and what is warranted by external checks. The observed accuracy therefore reflects not a lack of general intelligence but a reliance on shortcuts that are rational under constraints yet vulnerable to strategic manipulation.

Educational exposure alone does not guarantee procedural transfer. Knowing definitions of misinformation is different from deploying verification routines at the moment of judgment. Transfer requires the repeated use of concrete operations such as lateral reading, attribution checks, and the active search for disconfirming evidence. Without structured practice and feedback that map errors to the specific shortcut that produced them, students retain declarative knowledge but do not change their evaluation habits.

Finally, the pattern suggests that improvement is most likely when students are trained to recognize recurring reasoning traps that appear in social feeds. These include overinterpreting numerical precision, treating co-occurrence as causal, and neglecting base rates when assessing claims that describe rare events. Instruction that routinizes a short pause, a single confirmation step, and a quick search for the truth should raise performance.

- **Self-Assessment Abilities (H2)**

Participants exhibited weak self-assessment abilities: although confidence and correctness were positively correlated ($r = .209$, $p < .001$), confidence accounted for only about 4.4 percent of the variance in accuracy. ***This validates H2 while underscoring that the association is practically small.*** Statistical significance here is likely driven by the number of item level observations rather than a strong linkage between feeling certain and being right. Put plainly, confidence is a poor proxy for correctness in this task. Paired samples tests showed that mean confidence exceeded mean accuracy ($p < .001$), indicating systematic overconfidence rather than random fluctuation.

One driver is the hard easy asymmetry. When items are difficult because diagnostic information is sparse, people still experience certainty when a claim matches expectations formed by prior exposure. Identity relevance intensifies this effect by shifting goals from accuracy to coherence. The result is a systematic pattern in which individuals feel most certain precisely where independent verification would be most valuable.

This miscalibration is not a cosmetic problem. Confidence shapes downstream behaviour. Individuals who are wrong and sure are more likely to share, to disregard corrective information, and to reinforce the same heuristics in future judgments. The study's confidence–accuracy gap therefore signals an elevated risk of propagation that is not visible from accuracy alone. The remedy is to realign confidence with evidence. Therefore, critical reflection on confident errors is essential, so that students learn which internal cues led them and practice substituting verification steps. The goal is not lower confidence, but confidence grounded in external warrant.

- **Demographic Subgroup Insights (H3)**

Male students outperformed female students in both accuracy (0.75 versus 0.56) and calibration of confidence with correctness ($r = 0.241$, $p < 0.001$ versus $r = 0.116$, $p = 0.062$). The difference in accuracy is substantial in raw terms, yet several cautions apply. Group sizes, prior coursework, topic familiarity, and discipline mix can confound gender comparisons. If the item set contained topics differentially salient to one group, apparent skill differences may partly reflect domain familiarity rather than general detection ability. Without item level error profiles and covariate adjustment, the gender gap should be treated as provisional.

These differences also map onto response strategies. Some readers adopt a stricter acceptance criterion that requires explicit sourcing or a named institution, which reduces false positives on sensational falsehoods but can lower hits on true but unfamiliar items. Others prioritise narrative coherence and prior exposure, which helps on mainstream and repeated claims but fails on well-defined headlines. If male students in this sample were more willing to reject sensational content lacking explicit sourcing, that would raise accuracy on exactly the items that tend to mislead. If female students engaged more with lifestyle and health feeds, and if several items exploited health anxieties or wellness framings, vulnerability would increase in that slice of content.

The result for platform use suggests that regular usages on a network is not the right explanatory level. What matters is the composition of one's feed, the presence of cross cutting content, and the strength of verification habits within each platform. Algorithmic overlap across large networks also reduces between platform differences, so content behaviour dominates exposure. As users who are regularly on Instagram and YouTube

tend to be overconfident it might be an explanation that they trust their social feed on those platforms more. Regular users on these platforms tend to consume familiar content and less algorithmic suggestions.

Political orientation shows that centre and centre left participants perform better on both accuracy and calibration, while extremes do not. One explanation is straightforward. People at the political extremes often seek and prefer anti-mainstream stories. This makes them more likely to distrust established news sources and to trust sources that fit their views. When headlines hint at conspiracies or use specific framing, they are more likely to follow their preferences than to weigh the evidence carefully. The centre tends to rely more on institutional sources and to consume a broader mix of outlets, which fosters a content habit of asking for attribution and comparators before accepting a claim.

6. IMPLICATIONS

The fake news detection and self-assessment findings are largely coherent with previous findings in the literature. However, our data indicates interesting differences in abilities across demographic subgroups, warranting further exploration.

These findings carry three main *practical* implications: (1) A need to enhance media literacy training. Given that students' accuracy remains below our threshold of 75%, universities should incorporate explicit fake news detection modules. (2) Students should improve their self- assessment abilities. Overconfidence can lead students to increase their susceptibility to fake news. (3) Specifically target high risk groups. Female students and those at the political extremes exhibited poorer fake news detection and self-assessment abilities. Tailored workshops or peer- mentoring schemes could address these vulnerabilities without stigmatization. More broadly, German universities should adopt pre- and post-testing of detection abilities and confidence to evaluate the effectiveness of media literacy programs. **In Heilbronn**, embedding these assessments into orientation or disciplinary courses could both raise awareness of personal biases and measure learning gains over time.

From a *theoretical* **perspective, the** results **support** existing theories of misinformation detection that highlight the role of heuristic processing, motivated reasoning, and confidence miscalibration. The findings show that even in an educated university setting, detection performance is constrained by reliance on fast, intuitive judgments**.** The observed subgroup differences suggest that variations in detection ability may be better explained by differences in information habits, domain familiarity, and evaluative strategies than by inherent demographic traits. This points toward the value of integrating social-cognitive models of belief evaluation with media use and information exposure frameworks, **to** better understand how detection and calibration skills develop in different populations.
From a ***methodological*** view, this study demonstrates that applying an existing research design to a new university context can yield valuable and comparable data, even with a small sample. The replication confirms that the design functions as intended in measuring both accuracy and calibration while allowing for subgroup comparisons. However, the findings also expose the need for sufficient statistical power and item-level analysis to distinguish between general detection skill and topic-specific effects.

7. CONCLUSION

- **Conclusion**

This study investigated three interrelated questions at Hochschule Heilbronn: (1) how accurately students can distinguish real from fake news, (2) whether they overestimate or underestimate their detection abilities, and (3) which demographic subgroups are most at risk. Drawing on a validated set of 12 GermanFakeNC headlines (Vogel and Jiang 2019), we found that students achieved a mean accuracy of 66.5%, demonstrating that their detection abilities remain insufficient. Also, participants exhibited systematic overconfidence, as mean confidence ratings significantly exceeded actual performance, and Pearson's $r = 0.209$ ($p < .001$) showed only a weak correlation between confidence and correctness. Subgroup analyses revealed that female students and those at the political extremes displayed particularly poor abilities, while social media platform usage had little impact. Collectively, these findings complement prior work on undergraduate populations (Leeder 2019; Lyons et al. 2021) and extend it to the German university context.

- **Limitations**

Several limitations restrict the interpretation of our results, as partly already highlighted during the discussion chapter. First, the convenience sample of 55 students may not fully represent the broader Heilbronn student body or other German universities, particularly for small subgroups (e.g., far left and far right). A small sample limits precision and complicates subgroup conclusions. If internal consistency of the item set is modest, observed accuracy may reflect noise rather than stable ability. Second, our reliance on headline-only judgments

overlooks the richer context of full articles, multimedia cues, and source information that people often use in real world news evaluation. Third, self-reported demographic data and confidence ratings may be subject to response biases. Lastly, the 75% benchmark usefully sets a high bar, yet the field lacks consensus on what threshold ensures practical reliability in fast moving social feeds. Calibration analyses matter here, since overconfidence at moderate accuracy is especially risky for downstream sharing behaviour.

- **Future Research**

To build on this work, future studies should employ longitudinal designs that track changes in detection accuracy and calibration following targeted interventions, such as media literacy training. This would assess causal impacts on both detection abilities and self-assessment. Particularly our findings about gender and political orientation differences seem to be unaddressed. Expanding samples across multiple German institutions and fields of study would enhance generalizability and allow more robust and broader subgroup analyses.

In total, while Hochschule Heilbronn students demonstrate some capacity to detect fake news, their moderate accuracy and pronounced overconfidence highlight a critical need for enhanced, evidence-based media literacy training. By addressing both skill and self-assessment deficits, especially among identified risk groups, German universities can better prepare students to navigate today's complex information landscape.

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