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The Effectiveness of an Educational Intervention on Countering Disinformation Moderated by Intellectual Humility

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Abstract

There is an ongoing debate among scholars on how to tackle disinformation. Media education initiatives to increase literacy are effective ways to counter disinformation. Hence, the European Commission (2022) published *Guidelines for Teachers and Educators on Tackling Disinformation and Promoting Digital Literacy Through Education and Training*. The present research looked at the role of social media literacy in increasing awareness of the role of social media in spreading disinformation. We developed an educational intervention based on the European Commission guidelines. We investigated its impact on perceived social media literacy, the intention to share fake news on social media, and general conspiracy beliefs. We conducted a within-subject (two times measurement: before the educational intervention and one week after) +1 experiment with $N = 127$ young adults (aged 18 to 23). After filling in an initial survey, the experimental group received a 15-minute educational intervention on the role of social media for disinformation dissemination in complex digital information environments. One week later, all participants completed the second survey to assess perceived social media literacy and general conspiracy beliefs. In both surveys, participants saw three Instagram posts from a fictitious media outlet to express potential intentions to share on social media. Among the three posts, two showed false information. Findings showed that educational intervention produces a significant increase in perceived social media literacy and a decrease in general conspiracy beliefs. Intellectual humility moderates the impact of educational intervention on algorithmic awareness.

Keywords

conspiracies; conspiracies belief; digital literacy; Instagram; intellectual humility; social media; social media literacy

1. Introduction

In the complex digital information environments, disinformation is increasingly seen as a significant threat to democratic systems (Bennett et al., 2018). The rapid dissemination of false or misleading information through social media platforms and other digital channels has profound implications for the integrity of democratic processes and institutions (Allcott et al., 2018; Chirwa & Manyana, 2021; Watts et al., 2021). Disinformation campaigns exploit vulnerabilities in social media platforms, leading to epistemic cynicism, polarization, and pervasive inauthenticity (Pérez-Escolar et al., 2023). Exposure to disinformation can prime support for extremist positions and delegitimize democratic values, regardless of the source's authenticity (Hameleers et al., 2022). These effects undermine fact-based and respectful communication, essential for deliberative democracy (McKay & Tenove, 2020). The disruption of the public's ability to engage in informed and rational debate is a core threat posed by disinformation (Tenove, 2020).

Strategies to fight disinformation that were effective with certain limitations include fact-checking and debunking (Arcos et al., 2022; Chan et al., 2017), inoculation (Lewandowsky & Linden, 2021; Vivion et al., 2022), and forewarning, which aim to expose and disprove misleading content (Arcos et al., 2022). Given the constantly evolving social media landscape, previous studies highlighted the role of educational actions in countering the disinformation phenomenon (Nygren et al., 2022; Nygren & Guath, 2022). The European Commission (2018) developed an action plan to fight disinformation and stressed how crucial citizen education is and, in 2022, the European Commission (2022) published *Guidelines for Teachers and Educators on Tackling Disinformation and Promoting Digital Literacy Through Education and Training*. However, media education should be more comprehensive, beyond children and adolescents, and integrated into lifelong learning strategies for young adults.

Previous research stressed the role of social media in enhancing the disinformation phenomenon (Chirwa & Manyana, 2021; Corbu et al., 2020). Thus, the production and distribution of fake news and conspiracy theories are facilitated by platform affordances (Jain, 2023). Therefore, an educational intervention can raise awareness of the negative role of social media in spreading disinformation. Prior research delved into the role of digital media literacy in combating disinformation (Nygren et al., 2022; Nygren & Guath, 2022). However, a more nuanced understanding of the role of social media literacy is needed. Besides the role of intellectual humility (Leary et al., 2017), a concept related to critical thinking for the impact of educational intervention required additional attention from scholars. Disinformation poses a growing threat to democratic processes, and media literacy has emerged as a critical tool in combating this phenomenon, with media literacy initiatives designed to equip individuals with the skills to critically evaluate and interpret media content having gained prominence recently. Dame Adjin-Tettey (2022) demonstrates that media literacy education can effectively combat fake news, disinformation, and misinformation through experimental evidence. This aligns with broader trends observed across the European Union, where media literacy is increasingly integrated into educational policies and frameworks to address the disinformation crisis (Sádaba & Salaverría, 2023). Despite these advances, challenges remain in implementing these initiatives universally and effectively, particularly in rapidly evolving digital landscapes.

The present research looked at the impact of educational intervention on young adults (18 to 23 years) to enhance social media literacy, the intention to share on social media, and general conspiracy beliefs. Previous research on disinformation mainly focused on social media platforms such as X, formerly known as

Twitter (e.g., Dasilva et al., 2021; Keller et al., 2019; Linvill & Warren, 2020), and Facebook (e.g., Iosifidis & Nicoli, 2020; Jang et al., 2019). Even though Instagram is a popular platform among young adults (Shane-Simpson et al., 2018), investigating news sharing on this platform within the context of disinformation needs additional attention. Therefore, the present research investigates news sharing on Instagram. We developed an educational intervention based on the European Commission (2022) guidelines that we adapted for young adults and investigated its impact on social media literacy. Furthermore, we tested the moderating effect of intellectual humility (Leary et al., 2017) on the effectiveness of the educational intervention on algorithmic awareness, a crucial dimension of social media literacy.

2. Theoretical Framework

2.1. Empowering Critical Thinking Through Media Literacy

Media literacy is increasingly recognized as a critical skill in the digital age, where the proliferation of digital media and the prevalence of misinformation necessitates the ability to evaluate and interpret media messages critically. This skill is essential for informed citizenship, lifelong learning, and effective participation in a digitally connected society. Media literacy promotes critical thinking skills, enabling individuals to evaluate and choose information sources, interpret news, and make independent choices (Escoda et al., 2017; Mrisho & Dominic, 2023). It is essential for navigating the digital landscape, where misinformation and fake news are prevalent (Manzoor, 2018). Incorporating media literacy into educational curricula is crucial for developing skills in the digital age as media literacy education provides a framework for new literacy needed for living, working, and citizenship in the 21st century (Dolanbay, 2022). It helps individuals become conscious media consumers and producers, understanding the reality of media (Koltay, 2011). Developing critical approaches to digital media is a prerequisite for using them as learning resources (Burnett & Merchant, 2019; Dezuanni, 2015).

Media literacy is a multifaceted concept that can be defined and approached in various ways. For this research, we define media literacy following Potter's (2019) cognition-based approach, which focuses on understanding and processing media content through critical analysis. Potter's definition emphasizes the cognitive skills necessary for comprehending and evaluating media messages, a foundational aspect of media literacy. However, it is essential to acknowledge that media literacy is not limited to cognitive processes; it also involves affective components, such as emotional responses and attitudes toward media content (Pennycook & Rand, 2019). These aspects are particularly relevant for social media literacy, encompassing technical competency, social interactions, and awareness of disinformation and algorithmic processes (Tandoc et al., 2021). According to the European Commission, media literacy is "the ability to access the media, to understand and critically evaluate different aspects of the media and media contexts, and to create communications in a variety of contexts" (European Commission, 2022, p. 12).

Kellner and Share (2019) frame media literacy within the context of empowerment and critical citizenship, arguing that it should enable individuals to navigate the media landscape with a critical eye, discerning between credible information and misinformation, thereby fostering an informed and engaged populace capable of participating in democratic processes (Kellner & Share, 2019). Digital literacy is increasingly recognized as a cornerstone of effective participation in the modern digital information landscape. Given the inclusion of intellectual humility—a trait that involves recognizing the limits of one's knowledge and being open to revising beliefs—the theorization of media literacy in this study must incorporate cognitive and

affective dimensions. Intellectual humility aligns with the affective aspects of media literacy by promoting openness to new information and the willingness to change one's mind in light of new evidence (Leary et al., 2017). Thus, our conceptualization of social media literacy includes the cognitive ability to process information and the attitudinal and behavioral aspects that influence media consumption and interaction in digital environments.

According to Belshaw (2016), digital media literacy transcends basic technical skills, encompassing a broader set of competencies such as critical thinking, ethical considerations, and the ability to engage with digital content critically. Belshaw emphasizes that digital literacy is essential for navigating the complexities of the digital world, from discerning the reliability of online sources to engaging in productive online discourse (Belshaw, 2016). Ng (2015) discusses the integral role of digital literacy in professional and personal development, pointing out that in a world where digital technologies pervade every aspect of life, from workplace productivity tools to social media, digital literacy skills are vital for effective communication, problem-solving, and lifelong learning. This perspective illustrates the wide-ranging applicability of digital media literacy, making it indispensable in contemporary society (Ng, 2015). Media literacy is thus a vital skill in the digital age, essential for critical thinking, informed decision-making, and effective participation in a digitally connected society. Integrating media literacy into education is crucial for developing digital skills and fostering lifelong learning. By promoting critical approaches to media and acknowledging its sociocultural impacts, media literacy empowers individuals to navigate the complexities of the digital world responsibly and effectively. The importance of digital literacy in today's information-rich environment cannot be overstated, as digital technologies evolve, fostering digital literacy becomes ever more critical for empowering individuals to engage with and navigate the digital society effectively.

Previous studies stressed that media literacy education significantly enhances students' critical thinking abilities, enabling them to understand better and critique media content (Feuerstein, 2010; Zou'bi, 2021). Programs incorporating media literacy into the curriculum positively affect students' ability to critically analyze media messages and develop a skeptical approach to media consumption (Ku et al., 2019; Zou'bi, 2021). Collaborative efforts among educators, administrators, and parents are essential for successful media literacy programs (Brown, 1998) as adolescents who frequently consume news on social media and possess higher news media literacy are better at applying critical thinking to real-life news reports (Ku et al., 2019). Similar results might also be achieved through media education for early-stage adults, given that scholars pointed out that in social media, literacy-related critical performances develop during young adulthood (Zarouali et al., 2020).

Media literacy is about knowledge and the translation of that knowledge into critical actions and behaviors, essential for fostering a culture of critical thinking and embracing cultural diversity (Riesmeyer et al., 2019). Furthermore, critical thinking facilitates the deconstruction of media messages, enabling individuals to understand underlying motives, biases, and potential impacts (Pennycook & Rand, 2019). This analytical approach is vital in an era where media messages are designed to subtly influence public opinion and behavior. Pennycook and Rand's (2019) experimental studies highlight that individuals who engaged in critical reflection were less likely to be swayed by fake news, demonstrating the protective role of critical thinking in media consumption.

In examining the effectiveness of the educational intervention, it is crucial to distinguish between social media literacy as a skill set and social media literacy efficacy, which refers to an individual's confidence in their ability to use those skills effectively. Bandura's (1977) self-efficacy theory, which posits that an individual's belief in their ability to achieve specific outcomes is crucial for motivation and behavior, has been extensively applied across various domains, including health, education, and media literacy. This synthesis examines the intersection of Bandura's self-efficacy principles with media literacy, particularly emphasizing the impact of self-efficacy on media consumption and literacy practices. In media literacy, self-efficacy is critical in how individuals navigate the increasingly complex media landscape.

The concept known as "news efficacy," derived from Bandura's (1977) theory, illustrates how self-efficacy influences individuals' engagement with news media. Park (2019) demonstrates that news efficacy mediates the relationship between perceived news overload on social media and news avoidance, specifically, when individuals experience high news overload, their news efficacy decreases, leading to more significant news avoidance. Moreover, news efficacy also mediates the positive relationship between perceived news overload and social filtering, suggesting that individuals with higher levels of news efficacy are better equipped to filter and manage relevant news content despite the overwhelming volume of information available (Park, 2019). Despite its widespread application, self-efficacy theory faces ongoing theoretical and methodological challenges, particularly in its definition and assessment. Marzillier and Eastman (1984) argue that self-efficacy can only be fully understood by considering outcome expectations, raising concerns about the theory's comprehensiveness.

Additionally, the practical value of self-efficacy theory requires further empirical validation to demonstrate its effectiveness across different contexts (Marzillier & Eastman, 1984). The influence of self-efficacy extends into literacy education, significantly impacting students' reading abilities and performance. Ortlieb and Schatz (2020) emphasize that self-efficacy is crucial for literacy learning, as students' confidence in their reading abilities is closely linked to their actual performance, and, therefore, effective literacy instruction should incorporate self-efficacy principles to foster students' confidence and enhance their reading skills (Ortlieb & Schatz, 2020).

Social media literacy, which includes understanding the implications of digital platforms, is crucial for developing critical thinking and socio-emotional competencies (Polanco-Levicán & Salvo-Garrido, 2022). Social media literacy is a form of media literacy that reflects specific knowledge, attitudes, and behavior towards social media. Tandoc et al. (2021) highlighted four dimensions of social media literacy: technical competency; social relationship and interaction; awareness of the informational landscape, including disinformation awareness; and privacy and algorithmic awareness. Social media literacy can contribute to a comprehensive understanding of complex information environments (Polanco-Levicán & Salvo-Garrido, 2022) and, like media and digital literacy (Escoda et al., 2017), social media literacy can be improved with the help of education. Moreover, effective education can reduce disinformation dissemination (Nygren et al., 2022; Nygren & Guath, 2022).

Considering the relevance of social media for young adults, investigating social media literacy as a self-perceived participatory moral literacy is crucial (Wendt et al., 2023). Young adults aged 18–23 are particularly responsive to social media literacy interventions due to their brain development and social changes. Hence, the prefrontal cortex maturation, which takes place until the mid-20s, is responsible for

executive functions such as decision-making, impulse control, and critical thinking. During this period, young adults actively explore and solidify their identities, including their social, political, and cultural beliefs (Arnett & Mitra, 2020), with social media playing a significant role in this process by providing a platform for self-expression and exposure to diverse viewpoints (Arnett et al., 2020). Therefore, a literacy intervention can help them navigate this landscape critically, ensuring that their identities are shaped by reliable information rather than disinformation. Consequently, we hypothesized:

H1: The educational intervention improves perceived social media literacy (PSML).

H2: The educational intervention reduces the intention to share fake news on social media.

2.2. Reducing Conspiracy Beliefs Through Media Literacy

Conspiracy narratives represent a significant challenge to media literacy, as they endorse unfounded and often implausible explanations for events, leading to widespread misinformation and societal distrust. Media literacy, the ability to critically assess and interpret media content, is crucial in combating the influence of conspiracy theories (Lewandowsky et al., 2013), with research indicating that individuals with low media literacy are more susceptible to conspiracy theories (Pasek et al., 2015). This susceptibility arises from a need for more critical thinking skills to evaluate the credibility of sources and the validity of information. For instance, a study by Pennycook and Rand (2019) found that participants with higher levels of analytical thinking were less likely to believe in conspiracy theories. Educational interventions addressing critical thinking and intellectual humility can reduce conspiracy theory beliefs. Furthermore, algorithmic awareness is crucial in empowering social media users to evaluate the information they encounter critically and it can reduce the spread of disinformation. Therefore, we posited:

H3: The educational intervention significantly reduces general conspiracy beliefs.

H4: The educational intervention increases algorithmic awareness.

H5: The algorithmic awareness reduces (a) the intention to share fake news on social media and (b) conspiracy beliefs.

2.3. Intellectual Humility and the Relationship to Social Media Literacy

Intellectual humility, defined as recognizing the limits of one's knowledge and openness to new information, plays a complementary role in media literacy (Krumrei-Mancuso & Rouse, 2016). In the context of media consumption, intellectual humility involves acknowledging that one's initial beliefs may be incorrect and being open to revising them in light of new evidence (Leary et al., 2017). The synergy between critical thinking and intellectual humility creates a robust framework for media literacy: Critical thinking provides the analytical tools necessary to scrutinize information, while intellectual humility ensures openness to new evidence and perspectives (Krumrei-Mancuso et al., 2020). Together, these traits foster a balanced approach to media consumption that mitigates the risks of misinformation and cognitive biases. Krumrei-Mancuso et al. (2020) conducted a longitudinal study on college students, demonstrating that interventions designed to enhance critical thinking and intellectual humility improved media literacy outcomes. Individuals high in

intellectual humility are less likely to adhere rigidly to conspiracy theories when presented with credible, contradictory evidence (Bowes et al., 2020). The study revealed that participants who developed these skills were more adept at identifying misinformation and less susceptible to confirmation bias.

Moreover, integrating these cognitive traits supports lifelong learning and adaptability, essential qualities in an ever-evolving media landscape (Sinatra et al., 2016). Intellectual humility encourages continuous learning and the acceptance of uncertainty, while critical thinking equips individuals with the skills to evaluate new information critically. Thus, we asked the following research question:

> RQ1: Does intellectual humility play a moderating role between the educational intervention and PSML?

3. Method

3.1. Experimental Design and Procedure

To investigate the educational intervention's impact on enhancing social media literacy and reducing intentions to share fake news on social media and conspiracy beliefs, we conducted a within-subject (two-time measurement: before the social media literacy intervention and one week after) +1 experiment with $N = 127$ young adults, aged 18 to 23 ($M = 19.7$, $SD = .88$).

Developing a 15-minute educational intervention for adults aged 18 to 23 years on social media and disinformation offers several benefits, both for the target audience and the effectiveness of the intervention. First, this age group is among the most active on social media, making it crucial to understand how disinformation spreads. The intervention aimed to improve users' ability to critically evaluate social media, as this can foster informed and responsible digital behavior. Empowering young adults can lead to more confident and assertive engagement with social media (Wendt et al., 2023), reducing susceptibility to manipulation and, by educating this age group, which frequently shares content online, the intervention can help reduce the spread of disinformation. Furthermore, the intervention aims to contribute to developing broader critical thinking skills.

Second, a 15-minute format allows for a focused content delivery, conveying the key points clearly: This brevity helps maintain attention and engagement (Yeager & Walton, 2011), which is crucial given the short attention spans often associated with this age group. A 15-minute educational intervention for adults aged 18–23 is an effective way to quickly and efficiently equip this key demographic with the skills needed to navigate the complexities of social media and disinformation while being accessible, memorable, and easily scalable.

After the informed consent, all participants completed a survey using a Qualtrics link to measure our dependent variables, social media literacy and conspiracy beliefs, and potential confounding variables. All participants were instructed to view three Instagram posts as usual Instagram users do. We chose a fictitious media outlet to avoid preexisting attitudes towards an existing media outlet, with two posts showing fake news and one presenting accurate information. However, we did not mention the facticity of the news.

After filling in the survey, the experimental group (n_1 = 82) received a 15-minute presentation about disinformation in digital environments and the role of social media in disinformation spreading. The intervention was based on the European Commission's (2022) published *Guidelines for Teachers and Educators on Tackling Disinformation and Promoting Digital Literacy Through Education and Training*. However, given that the European Commission guidelines were aimed at education in schools, following the primary information from the guidelines, the intervention was adapted for the young adult age group. The description of the intervention is available online in the supplementary materials. The control group (n_2 = 45) attended a 15-minute presentation on a topic non-related to the subject of the investigation.

One week later, all participants completed the second survey, using the Qualtrics platform to self-assess social media literacy and general conspiracy beliefs. We applied the survey not immediately after the first intervention to avoid potential bias while filling in the questionnaire assessing the same variable. Furthermore, the participants also saw three Instagram posts from the same fictitious media outlet, as shown in the first survey, and expressed intentions to share each Instagram post on social media. In this case, two out of the three posts also presented fake news related to different topics such as the economy, alimentation, and healthcare. Examples of Instagram posts containing news are shown in the supplementary materials.

A debriefing was included at the end of both surveys, pointing out the posts that presented fake news. The study was conducted after receiving the approval of the reviewer board of the Doctoral School of Communication, Public Relations, and Advertising of the Babeș-Bolyai University.

3.2. Stimulus Materials and Participants

The educational intervention was delivered as a short lecture presented by an experienced faculty member. First, students were introduced to concepts such as disinformation, misinformation, and the types of fake news (Tandoc et al., 2018). The presentation's topic of disinformation and the impact of sharing fake news on social media was central, and how social media algorithms influence information spreading was also highlighted.

Participants (86% female) were 88% undergraduate, and the rest were graduate students at a large European university that used Instagram (53% more than one hour daily). The popularity of Instagram among female users highlights the platform's role in shaping self-perception and social interaction (Shane-Simpson et al., 2018). We recruited the participants by posting an advertisement in the university and they were then randomly assigned to one of the two conditions. Participation was voluntary, and they received credits in exchange. The initial number of participants who filled out the first survey was 160; however, 140 participants filled in the second survey.

Furthermore, after eliminating uncompleted answers and participants with no Instagram account, the final number of participants was downsized to 127. A priori power analysis with G*power 3.1 was conducted to determine the minimum sample size for our experimental design. We considered two groups and two measurements for the alpha error probability set to α = .05, power = .95, and the minimum sample size needed is N = 106. Hence, with N = 127 participants, our final sample aligned with the requirements.

3.3. Measures

PSML was measured using 14 questions assessing four dimensions. Technical competency was measured using five questions (e.g., "I know how to remove unwanted content from my social media account"), social relationship with three questions (e.g., "I know how to handle conflicts on social media appropriately"), informational awareness with three questions (e.g., "I can tell whether information on social media is true or false"), and algorithmic awareness also with three questions (e.g., "social media platforms such as Instagram control what I see on social media"). Responses were given on a 5-point Likert scale from 1 *totally disagree* to 5 *totally agree* (Tandoc et al., 2021).

"Intention to share the news" was measured for each of the news presented in the three Instagram posts in the first survey and in the second one with the question: "How likely would you be to share this news on social media (e.g., via Instagram posts, direct messages or other social media platforms)?" Responses were given on a 5-point Likert scale from 1 *extremely unlikely* to 5 *extremely likely*. We only considered the responses to fake news (two items for the first survey and three for the second study).

General conspiracy beliefs were measured with 12 statements, such as the belief in undisclosed important events, politicians not revealing true motives, government agencies closely monitoring citizens, seemingly unrelated events being the result of secret activities, and the influence of secret organizations on political decisions (e.g., "I think there are a lot of very important things going on in the world that the public is never informed about"). Responses were given on a 5-point Likert scale from 1 *totally disagree* to 5 *totally agree* (Brotherton et al., 2013).

Intellectual humility was measured with six statements (e.g., "in the face of contradictory evidence, I am open to changing my opinion") and responses were given on a 5-point Likert scale from 1 *totally disagree* to 5 *totally agree* (Leary et al., 2017).

Instagram usage was measured with a single question (1 = "less than 10 minutes daily" to 6 = "more than three hours daily,"; $M = 4.5$, $SD = 1.24$). "Instagram attachment" was measured using six items (e.g., "I would be sorry if Instagram closed"). Responses were given on a 5-point Likert scale from 1 *totally disagree* to 5 *totally agree* ($\alpha = .79$, $M = 3.79$, $SD = .76$; Alhabash & Ma, 2017); frequency of news consumption was measured with a single question on a 6-point Likert scale (e.g., "how often do you normally access the news? By news, we mean international, national, or regional/local news accessed through any platform [e.g., newspapers, radio, TV, online, social media]") from 1 *not at all* to 6 *more than then times daily* ($M = 3.61$, $SD = 1.18$). Survey items are presented in the supplementary materials.

4. Findings

4.1. Randomization Checks and Descriptive Statistics

Randomization checks for age ($t\ (126) = 7.67$, $p = .06$), gender ($\chi^2(1) = .28$, $p = .59$, $\phi = .05$), Instagram usage ($t\ (126) = 1.27$, $p = .89$), Instagram attachment ($t\ (126) = .64$, $p = .72$), and interest in the news ($t\ (126) = -.54$, $p = .53$) showed no significant differences between the two conditions (with and without educational intervention).

The participants' self-assessed social media literacy scores were also high before the intervention, with reported high scores in intellectual humility. Table 1 shows means and *SD* per condition for mediator and dependent variables.

Table 1. Descriptive analysis and reliability analysis.

	Before the educational intervention		After the educational intervention	
	M (*SD*)	α	*M* (*SD*)	α
PSML	4.28 (.43)	.82	4.36 (.38)	.71
Technical competency	4.85 (.49)	.91	4.89 (.41)	.79
Social relationship	3.61 (.81)	.78	3.79 (.73)	.73
Informational awareness	4.03 (.67)	.79	4.09 (.63)	.80
Algorithmic awareness	4.24 (.67)	.65	4.33 (.64)	.61
General conspiracy beliefs	2.89 (1.03)	.91	2.14 (.95)	.94
Intention to share the news	2.19 (1.11)	—	1.76 (.98)	—
Intellectual humility	4.19 (.50)	.71	—	—

Note: $N = 127$.

Except for the PSML measured before and after the intervention and intellectual humility measured only before the intervention, there are no significant correlations between variables. Table 2 shows bivariate correlations between variables measured before and after the intervention.

Table 2. Bivariate correlations.

Variable	1	2	3	4
PSML	1	−.054	.004	.32**
General conspiracy beliefs	−.003	1	.166	.030
Intention to share the news	−.055	.145	1	.115
Intellectual humility	.351**	.044	−.089	1

Notes: $N = 127$; ** correlation is significant at the .01 level (two-tailed); Pearson correlations below the diagonal are for the variables measured before the intervention; Pearson correlations above are for those measured after the intervention; intellectual humility was measured only before the intervention.

4.2. Hypotheses Testing

We posited that the educational intervention improves PSML (H1). The paired-sample t-tests for PSML for the non-intervention ($t\ (44) = -.85$, $p = .40$) and the intervention group ($t\ (81) = -3.03$, $p = .003$) showed that the intervention had a significant positive effect on PSML. Thus, H1 was supported.

We hypothesized that the educational intervention reduces the intention to share fake news on social media (H2). The paired-sample t-tests for the intention to share fake news for the non-intervention group ($t\ (44) = -.71$, $p = .48$) and for the intervention group ($t\ (81) = .90$, $p = .37$) showed that the intervention had no significant effect in reducing fake news sharing. Hence, we found no support for H2.

We posited that the educational intervention significantly reduces general conspiracy beliefs (H3). The paired-sample t-tests for general conspiracy beliefs for the non-intervention (t *(44)* = 1.51, p = .14) and the intervention group intervention (t *(81)* = 3.06, p = .003) showed that the intervention had a significant positive effect in lowering the general conspiracy beliefs. Thus, H3 was supported. Table 3 shows descriptives per condition.

Table 3. Descriptives per condition.

	Before the educational intervention		After the educational intervention	
	Control group	Intervention group	Control group	Intervention group
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
PSML	4.16 (.54)	4.22 (.49)	4.35 (.34)**	4.44 (.29)**
Intention to share the news	1.89 (.88)	2.06 (.88)	2.31 (1.10)	2.19 (.99)
General conspiracy beliefs	2.87 (.85)	2.98 (.95)	2.91 (.79)**	2.64 (.91)**

Notes: N = 127; ** p < .01.

To test H4, H5a, and H5b, we applied model 7, PROCESS macro 3 in SPSS (Hayes, 2022), employing 5,000 bootstrap samples for each dependent variable. We tested the conditional effects of the educational intervention mediated by algorithmic awareness measured after the intervention on the intention to share fake news and on general conspiracy beliefs, considering intellectual humility as a moderator. The control group was used as a reference group.

We posited that the educational intervention enhances algorithmic awareness (H4). The educational intervention significantly enhanced algorithmic awareness (b = 2.93, SE = .94, 95% CI = [1.07, 4.78], p = .002). Thus, H4 was supported.

We posited that algorithmic awareness reduces (a) the intention to share fake news on social media and (b) conspiracy beliefs (H5). Algorithmic awareness has no significant effect on the intention to share fake news (b = −.05, SE = .13, 95% CI = [−.32, .22], p = .71) and reduced general conspiracy beliefs (b = .30, SE = .13, 95% CI = [.05, .56], p = .02). Therefore, H5a was not supported, and H5b was supported.

Regarding the moderating effect of intellectual humility, our findings showed that intellectual humility has a direct positive effect on algorithmic awareness (b = .30, SE = .13, 95% CI = [.05, .56], p = .02). The interaction effect between the educational intervention and intellectual humility has a significant negative impact on algorithmic awareness (b = −.65, SE = .22, 95% CI = [.05, .56], p = .004). The moderating mediation is significant for the general conspiracy beliefs (Index = −.43, *BootSE* = .17, 95% *BootCI* = [−.76, −.08], p = .01) and not for the intention to share fake news (*Index* = −.05, *BootSE* = .13, 95% *BootCI* = [−.32, 22], p = .71). At low (M = 3.69, SD = .5) and medium levels of intellectual humility (M = 4.19, SD = .5), algorithmic awareness enhances. However, high levels of intellectual humility (M = 4.69, SD = .5) significantly lower algorithmic awareness. Interaction effects are depicted in Figure 1.

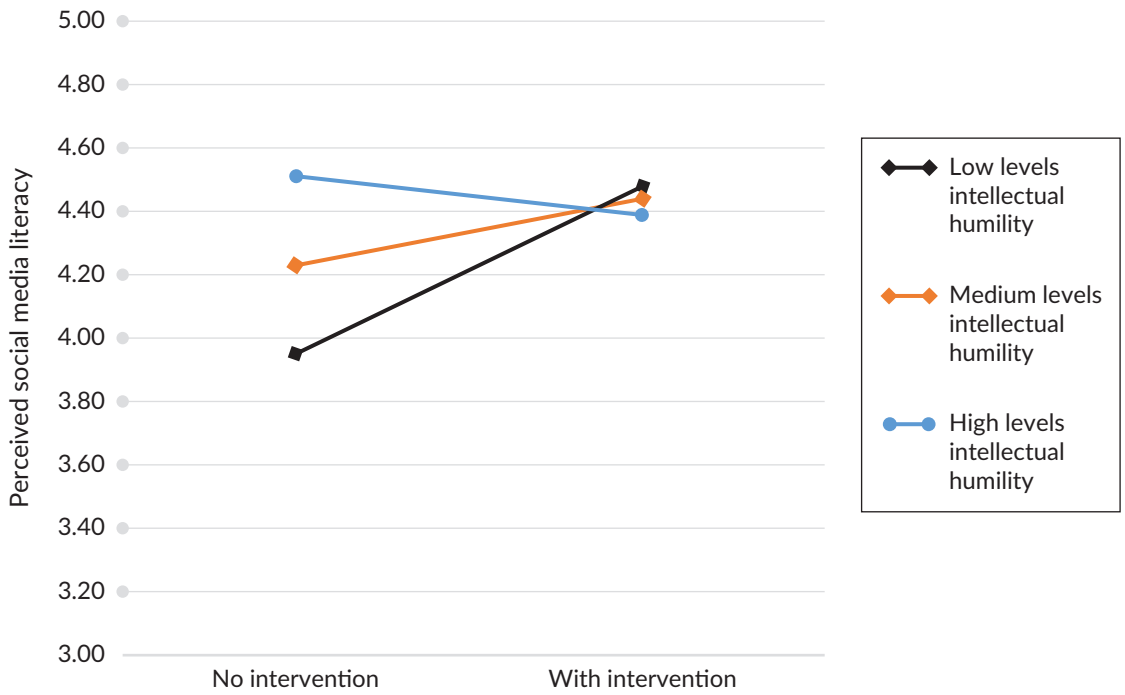

Figure 1. Interaction effects of the intervention moderated by the intellectual humility on the PSML.

5. Discussion

The study's main takeaway is that educational intervention effectively enhances PSML. Hence, our findings align with previous research on the impact of education on media literacy (Escoda et al., 2017; Nygren et al., 2022). In other words, young adults who participated in the presentation thought they knew more about how social media works from the perspective of technological skills, relationships on social media, information environment, and algorithmic awareness. However, the educational intervention did not significantly lower participants' intentions to share fake news on Instagram. Information environments are complex; there are several areas of disinformation, as we reflected in the various types of fake news in our survey (e.g., focusing on politics or the economy). Hence, there is no general solution to fight disinformation; there is a need for nuanced literacy interventions and other aspects to be considered.

Our research unveiled the moderating role of intellectual humility in the interaction between educational intervention and algorithmic awareness, the latter being a part of social media literacy. Thus, the educational intervention increased algorithmic awareness for lower and medium levels of intellectual humility. However, for high values of intellectual humility, the intervention has quite the opposite effect by lowering the PSML. Intellectual humility reflects critical thinking and the openness to learn new things, and high levels of intellectual humility intervention reduce its impact on PSML. Our findings have also highlighted the role of education in lowering participants' conspiracy beliefs (Lewandowsky et al., 2013; Pennycook & Rand, 2019).

6. Conclusion

This research contributed to a nuanced understanding of the impact of educational intervention in countering disinformation, as we highlighted the role of educational intervention beyond a skills-oriented

concept of literacy. However, our findings must be interpreted considering the study's limitations. First, the research was conducted with a convenience sample of university students with high self-reported social media literacy levels, and our sample included 86% women. Gender differences in social media usage are evident across various platforms. These distinctions manifest in the frequency and type of content shared by users, with females more inclined to share photos, especially on visually oriented platforms like Instagram, whereas males are more active in sharing images related to hobbies (Jambulingam et al., 2014; Thelwall & Vis, 2017). Therefore, future research should be conducted on gender-balanced samples. Second, our variables were self-assessed. Third, participants did not identify the news as fabricated before expressing their intention to share the post. Fourth, we did not include political knowledge and attitudes in our conceptual model, which are relevant variables in the complex information environment. And fifth, we did not measure the long-term effects of the educational intervention. Therefore, future research should investigate the long-term effects of educational intervention on a diverse sample.

The study has theoretical and practical implications by highlighting the role of educational intervention on social media literacy. With the moderating role of intellectual humility showing boundary conditions of the educational intervention at the individual level, we added to previous scholarship on the role of educational intervention in countering disinformation (Nygren et al., 2022) and the relationship between media literacy and critical thinking (Escoda et al., 2017). Educational interventions effectively enhance participants' perceived level of social media literacy. The intervention's value lies in its potential to boost efficacy, motivating individuals to apply critical thinking and literacy skills in media consumption consistently. However, it is also essential to recognize the limitations of focusing on efficacy alone, as high efficacy without corresponding skills could lead to overconfidence and potential neglect of the critical evaluation processes that media literacy seeks to promote.

Following Bandura's (1977) conceptualization of self-efficacy, while our intervention may have increased participants' confidence in their social media literacy, this does not necessarily equate to enhancing their skills. Moreover, we did not measure actual behavior in our study as our measurements were self-assessed, and we looked at behavioral intentions. Our research has implications for researchers, educators, and policymakers.

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Conflict of Interests

The authors declare no conflict of interests.

Supplementary Material

Supplementary material for this article is available online in the format provided by the author (unedited).

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