Psychology of Popular Media

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Within the field of misinformation, the study focuses on the overlooked phenomenon of racial hoaxes (RHs), defined as misleading news in which the protagonist is negatively described in relation to his/her ethnicity. This work aims to investigate the role of socioanalytic processing through the use of a conversational web app (Rolling Minds) designed to promote awareness among adolescents about the risk associated with anti-immigrant RHs. The sociocognitive intervention procedure has been designed from the literature on media biases' reflection, integrating it with studies on mediated intergroup contact which show that reading the narrative from the perspective of the outgroup member can be crucial in reducing prejudice. The study involved 239 adolescents, 144 experimental group and 95 control group ($M_{\text{age}} = 14.6$), and it demonstrates a significant increase in contact intentions. In particular, a path analysis model—controlled for age and gender—shows that a higher level of analytical reading and rewriting performance increases adolescents' contact intentions toward immigrants, also controlling for individual propensity to engage in analytical reasoning. Overall, these results attest that promoting specific social cognitive processes with the conversational approach of the Rolling Minds web app enables imagining a civic use of media that counteracts discriminatory behaviors potentially emerging from racial misinformation.

Public Policy Relevance Statement
This study explores the impact of a conversational web app (Rolling Minds) based on the promotion of socioanalytic processing when reading RHs. The intervention procedure is built on insights from the literature on media bias reflection while also incorporating the findings from studies on intergroup-mediated contact. The results show that through the interactive learning experience with conversational agents, a significant increase in contact intentions was found among the participating adolescents.

Keywords: racial misinformation, conversational media, analytical reasoning, mediated intergroup contact, adolescent media intervention

The spread of misinformation is currently a phenomenon of great interest to researchers, educators, and teachers (Gwiaździński et al., 2023). In recent years, there has been exponential growth in the literature on preventing misinformation, particularly in the development of so-called psychological prebunking interventions (van der Linden, 2022). Nudging interventions (Roozenbeek et al., 2022), which demand low motivation, are distinct from boosting interventions (Gwiaździński et al., 2023), characterized by a high level of participant engagement. Nudging interventions seek to encourage potential victims to verify the accuracy and credibility of misleading information

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through the promotion of analytic processing (Pennycook & Rand, 2019). Conversely, boosting interventions focus on enhancing individuals' cognitive and motivational competencies. In this latter scenario, inoculation video games are included, which aim to combat the negative effects of misinformation by teaching players to identify its manipulation strategies, such as emotional manipulation, conspiracy theories, or logical fallacies (Lewandowsky & Yesilada, 2021; Pennycook & Rand, 2019; Saleh et al., 2024). Another interesting boosting intervention is based on the promotion of analytical thinking by Lutzke et al. (2019), which illustrates how proposing a set of guidelines for evaluating news online or reading and then assessing the importance of each guideline can effectively prime analytical thinking before individuals encounter fake news.

Both types of intervention are primarily designed for adults or young adults, neglecting the adolescent age group. According to the literature, adolescents are particularly vulnerable to fake news (Herrero-Diz et al., 2021; Papapicco et al., 2022). This vulnerability arises because their reflective-analytic system is still developing. Additionally, adolescents must manage the search for immediate gratification, which is influenced by the intuitive-impulsive system. This system is further driven by the presence of peers and the desire for social inclusion, as well as the need to share interests with others (Beyens et al., 2016; Pappas, 2022).

Regarding the adolescent phase, for example, Paul and Elder (2004) highlighted the necessity of promoting analytical processing. This can be achieved by teaching young people to identify media biases, starting with the point of view from which the story is told. Subsequently, they should identify which points of view are denied or ignored, and finally, they should learn to distinguish between the facts underlying the story and the interpretation given to those facts. Although these forms of intervention predominantly focus on political misinformation, they often neglect the specific nature of each type of manipulated information, especially concerning the psychosocial effects produced. For instance, discrimination is particularly elicited by the so-called racial misinformation, which involves distorted (but not necessarily false) information presented as a health or safety threat attributed to a person belonging to a different ethnic group (Cerase & Santoro, 2018; D'Errico et al., 2022; C. Wright et al., 2021). In this context, enhancing adolescent awareness about racial misinformation serves as a means to prevent racism and promote intergroup contact, thus mitigating the ethnic biases associated with this type of information disorder. Such efforts help young people recognize distorted beliefs during a critical developmental phase, where they are highly susceptible to forming prejudicial attitudes and behaviors (Beelmann & Lutterbach, 2022).

In this regard, alongside the analytical recognition of the distorted and stereotypical beliefs of racial hoaxes (RHs), it also seems necessary to take into consideration the social component represented by the so-called mediated contact, that is, via mass media such as newspapers, with a member of the outgroup (Mutz & Goldman, 2010; Schiappa et al., 2005). This approach allows the potential reader of RHs to consider the alternative points of view involved in the narrative, including that of the stigmatized member.

In particular, the mediated contact literature (Mutz & Goldman, 2010; Schiappa et al., 2005) highlighted how ethnic prejudice can be reduced by eliciting perspective taking of the outgroup character (Harwood, 2017). From its narrative, in-group media users have the possibility to identify with him as an actual person, thus placing him within the same human category, reducing intergroup anxiety and prejudice toward him (Visintin et al., 2017), and in turn promoting real intergroup contact (Barni et al., 2020).

Starting from these premises, the present study aims to test a sociopsychological intervention on adolescents focused on this type of misinformation, that is, RHs, that can actually reinforce negative prejudice toward immigrants (C. Wright et al., 2021). For this purpose, we integrated the media biases intervention (Paul & Elder, 2004) with the sociopsychological approach to mediated contact (Mutz & Goldman, 2010) in order to overcome ethnic prejudice through a conversational web app (Rolling Minds), by inducing socioanalytical processing of potentially misleading news in adolescents and promoting positive effects in terms of intergroup contact (Figure 1).

Specifically, Rolling Minds utilizes an engaging conversational approach (Gulz et al., 2011; Tegos et al., 2015), and through an active peer educator (Sofia), the user reflects and interacts with her to collaboratively solve the scenario requests and challenges (Veletsianos & Russell, 2014). The results of this interactive web-based intervention on adolescents highlighted how it can improve their intergroup contact intentions—also controlling for the participants' propensity to analytical reasoning (Pennycook & Rand, 2019), thus playing a crucial role in preventing ethnic prejudice and discrimination (Banas et al., 2020).

Misleading Racial News and How to Counter Associated Prejudice and Discrimination

Racial hoaxes can be considered a subtype of misinformation and can be defined as communicative acts with distorted information presented as a threat to health or safety, where the perpetrator must be a person or group of people described in terms of ethnicity, nationality,

Figure 1
Conceptual Model

SOCIO-ANALYTICAL PROCESSING
OF MISLEADING NEWS

Racial hoax exposure → Analytical reflection on media biases + Mediated contact with an outgroup member → Intergroup contact intentions
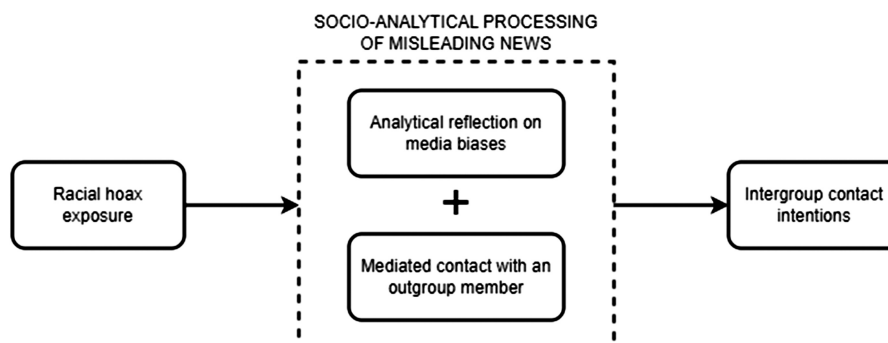
or religion (Cerase & Santoro, 2018; D'Errico et al., 2022). In particular, this kind of misleading news may include a bias toward the person responsible for the action that can be described using marked or implicitly negative evaluations: the news could contain emotive and sensationalistic language (i.e., language bias), exaggeration and over-interpretation of the fact (i.e., factual bias), or also the description of the fact by considering only one side, instead of providing a more complex framework of the news (Litovsky, 2021). Furthermore, Lewandowsky and Yesilada (2021) demonstrated how misleading information about issues pertaining to radical Islam is characterized by fallacies such as polarization, hasty generalizations, and the invocation of emotions. In particular, misleading racial news often contains typical linguistic forms of stereotypes, primarily focused on the absence of morality, and prejudices aimed at dehumanizing and attributing various types of threats to their protagonists (D'Errico et al., 2022). The stereotypical and schematic view of immigrants can be a powerful way to propagate biased information by reinforcing anti-immigrant attitudes and discrimination among both adults and young people, as demonstrated by C. L. Wright and Duong (2021). A recent work by D'Errico et al. (2024) pointed out how it is possible to prevent racial misinformation among digital natives by promoting analytical processing focused on media biases (Paul & Elder, 2004) and through mediated contact with a person belonging to an outgroup (Mutz & Goldman, 2010). In particular, it was found that analytical processes are supported by the participants' level of propensity for analytical reasoning, and that these processes directly hinder the formation of distorted ethnic beliefs. Overall, these results suggest that socioanalytical processes could be an effective key intervention for counteracting distorted beliefs (e.g., ethnic moral disengagement) associated with discrimination and ethnic prejudice induced by racial misinformation. These findings are also supported by studies focused on misinformation and discrimination: analytical thinking could be a way to reduce vulnerability to fake news (Pennycook & Rand, 2019) and could also help reduce reliance on prejudice and stereotypes by promoting cognitive flexibility (Yilmaz et al., 2016) and open-minded thinking (Bronstein et al., 2019; Swami et al., 2014). Besides inducing analytical thinking, the cited study (D'Errico et al., 2024) highlighted the importance of countering racial misinformation by humanizing immigrants through mediated contact (Banas et al., 2020; Mutz & Goldman, 2010; Pettigrew & Tropp, 2006; Schiappa et al., 2005). This is achieved by reading or listening to their personal stories (Figenschou & Thorbjørnsrud, 2015), a procedure that helps reduce participants' biased beliefs by promoting contact intentions and behavioral inclusiveness (Birtel et al., 2019). From this perspective, Johnson et al. (2013) also demonstrated that encountering a full counternarrative was particularly effective at reducing implicit prejudice. Additionally, the work of Paravati et al. (2022) has shown that reading personal stories improves explicit and helpful attitudes toward refugees. Cocco et al. (2022) operationalized vicarious contact by having participants read and create fairy tales about stigma-based bullying, where the majority of characters bullied minority characters; the results show that this intervention increased intergroup empathy, antibullying peer norms, and stimulated contact intentions.

Taking into account this theoretical consideration, the aim of the present study was to investigate whether participants can reduce their biased beliefs associated with contact intentions (Birtel et al., 2019) through a composite intervention: by inducing analytical reflection through boosting the recognition of biases in RHs

(D'Errico et al., 2024; Paul & Elder, 2004) and also by humanizing the outgroup member through mediated contact (Mutz & Goldman, 2010), that is, by reading the immigrant's point of view on the distorted news. More specifically, our main hypothesis is that intergroup contact can be promoted by recognizing the biases of the RH through guided analytical reading (Faragó et al., 2024; Lutzke et al., 2019; Paul & Elder, 2004), as well as through rewriting the news after being exposed to the alternative viewpoint of the protagonist through mediated contact (Mutz & Goldman, 2010). This hypothesis will also be compared with a control group that does not engage in the analytical reading and rewriting.

In addition, in this model, we will take into account the individual's propensity to analytical reasoning, as this seems to be an important variable to consider in the literature (Faragó et al., 2024; Pennycook & Rand, 2019; Yilmaz et al., 2016).

Overall, we expect that the sociocognitive processes activated through the Rolling Minds conversational web app can significantly improve contact intentions while controlling for both preexisting contact intentions and the propensity for analytical reasoning.

Method

Sample

The study targeted adolescents and collected data from two Italian schools using a convenience sample method. The total number of participants included in the intervention was 239 (144 experimental group and 95 control group), 31.5% male, 68.1% female, and 0.4% nonbinary. The age range of the sample was between 13 and 17 years, with an average age of 14.6 ($SD = 0.77$).

Procedure

The research project was carefully presented to the staff of the involved schools, and because the participants were all underage, the questionnaires were administered only after receiving appropriate informed consent with signatures from the students' legal guardians. None of the participants refused to participate or withdrew from the study. After the final administration, an appropriate debriefing was conducted with all participants. All procedures strictly followed the Helsinki ethical principles and were in accordance with the ethical code of the AIP (Italian Psychology Association); moreover, the design and the procedure were approved by the ethics committee of the University with which two of the authors (D'Errico and Cicirelli) are affiliated (Reference Code: ET-22-01).

Rolling Minds Web App

During two sessions each lasting 1 hr, the participants were asked to interact with the conversation-based web app named Rolling Minds, specifically designed for teenagers. As conversational artificial agents can be used as pedagogical tools for offering interactive learning experiences (Tegos et al., 2015), the conversational storytelling tool takes the form of a chat in which, depending on the case, the user can select a response from multiple choices or has the option to freely express his/her opinions, lowering the social cost of being evaluated present in the classical experimental settings.

Throughout the web app, the users interact with two avatars: a peer educator named Sofia, a group of her friends who are part of a debunkers' club called Rolling Minds (along with her), and Sofia's

aunt Susanna, who does not know how to interact properly with social media and has a naïve approach toward online misinformation. The characters and their dialogues were implemented following the literature on conversational agents: From a methodological perspective, the conversational approach can increase the ecological validity of the web app phases. The avatar can create a common ground between the agent and the user/learner, enabling a relaxed and balanced atmosphere in which learning can occur. This fosters user engagement and motivation (Veletsianos & Russell, 2014). Furthermore, activating a collaborative relationship with the peer educator, who represents a social actor that needs to be helped by the users, involves participants in a constructive relationship that can model the target behaviors (Fogg & Nass, 1997).

The social enrichment of this experience is also reinforced by the logic of distributed cognition, where the conversational agent "can scaffold learners by asking questions, providing hints, or offering alternative perspectives" (Veletsianos & Russell, 2014). Additionally, the conversational web app can elicit positive emotions by giving constructive and positive feedback on each individual task through the use of badges that certify the achievement of objectives set by the peer educator (e.g., become a debunker), which is presented in a friendly and welcoming manner.

The use of conversational agents, as demonstrated by Schuetzler et al. (2018), limits the effect of social desirability compared to classic face-to-face interviews. Furthermore, the dialogues were designed to have Sofia and her aunt talk about their own life experiences, ideas, and opinions (e.g., "I moved to the city a few weeks ago. I just started school here"; "My parents travel a lot around the world, and I go with them. I feel like a citizen of the world, a bit French, a bit English"; "I really enjoy talking and sharing my ideas with others. I think it's nice to engage with people, even with those who have different ideas from mine.") Conversing with an avatar that reveals various information about itself, showing a good level of self-disclosure, engaging with the user, asking for his opinion, and urging the user to reveal his own also favors a less demanding response (Kang & Gratch, 2011).

Through the various steps of the web app, Sofia and the user then have the common goal of increasing aunt Susanna's ability to recognize RHs, notice their characteristics (i.e., media biases), and help her understand the risks inherent racial misinformation. These common tasks will give the user the ability to receive assigned badges, thus having feedback on the interaction.

Rolling Minds has a modular structure, consisting of several sequential stages. Through the first two phases, "Introduction" and "Nice to meet you, I'm Sofia!" the goal is to profile adolescents. To engage the user in conversation during this phase, Sofia shares her personal history and social interests (Figure 2a) and, through an engaging conversational approach, asks the user about her own sociodemographic information and other psychological measures, such as contact intentions with out-group (African) members (Figure 2b).

In the next phase, "What do you think?" Sofia reveals that she is involved in a group of debunkers called "Rolling Minds," that usually help people to analyze misleading news (Figure 2d), by showing

Figure 2
Main Phases of Rolling Minds
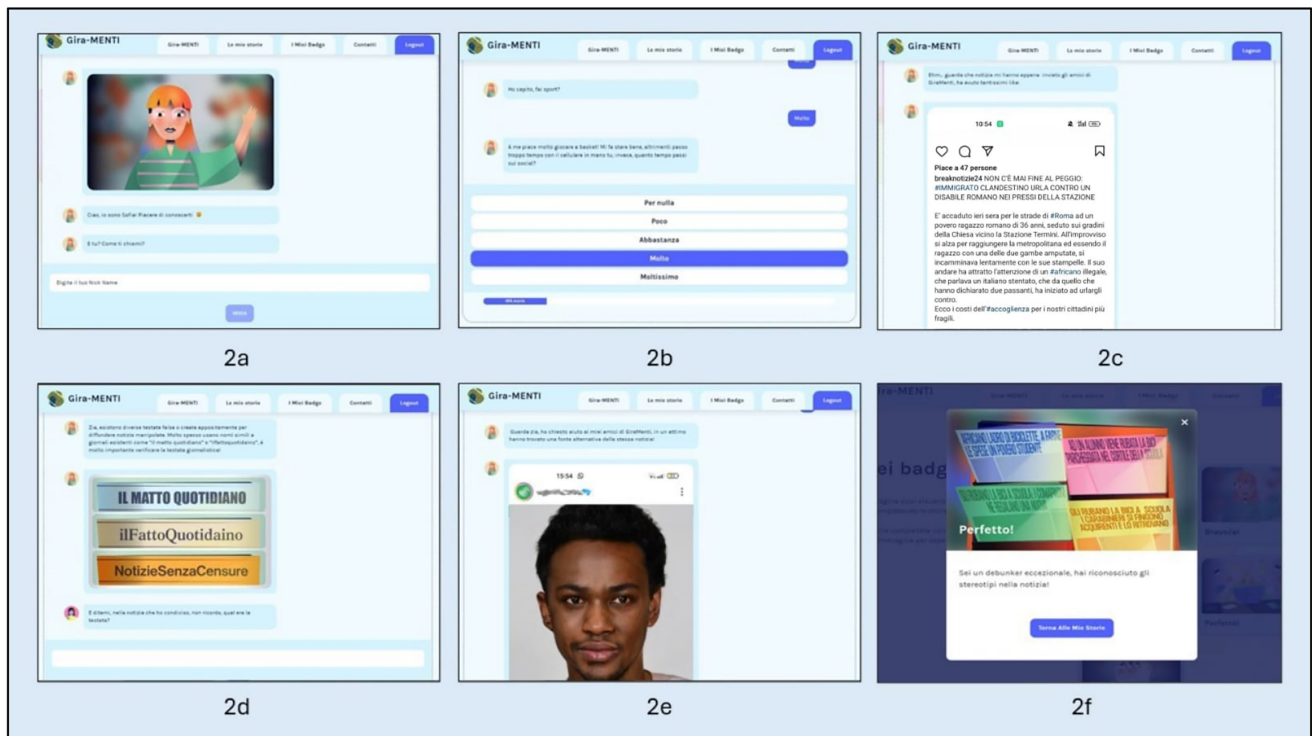

Note. (a) Sofia Introduces Herself by Creating an Engaging Interaction, (b) Profiling Module, (c) Reading a RH, (d) Identifying media Biases, (e) Interacting With Said's Story My Means a Mediated Contact, and (f) Example of Badge. RH = racial hoax. From Generated Photos, 2024 (https://generated.photos/). In the public domain. See the online article for the color version of this figure.

to the user an example represented in Figure 3. At the end of this phase, the user receives feedback in the form of a badge related to one's propensity to believe RHs (in order: "Great, you paid close attention! Keep up the good work!" "Good job, try a little harder and it will be perfect!" "You focused but there were some oversights … surely you can try harder!";Figure 2f). The badges were designed to offer positive feedback to all participants, even those who did not fully complete or correctly perform the required tasks. They also suggest areas for improvement, thereby fostering collaboration between the user and the peer educator, Sofia, in a comfortable, stress-free environment.

Figure 3
Example of RHs
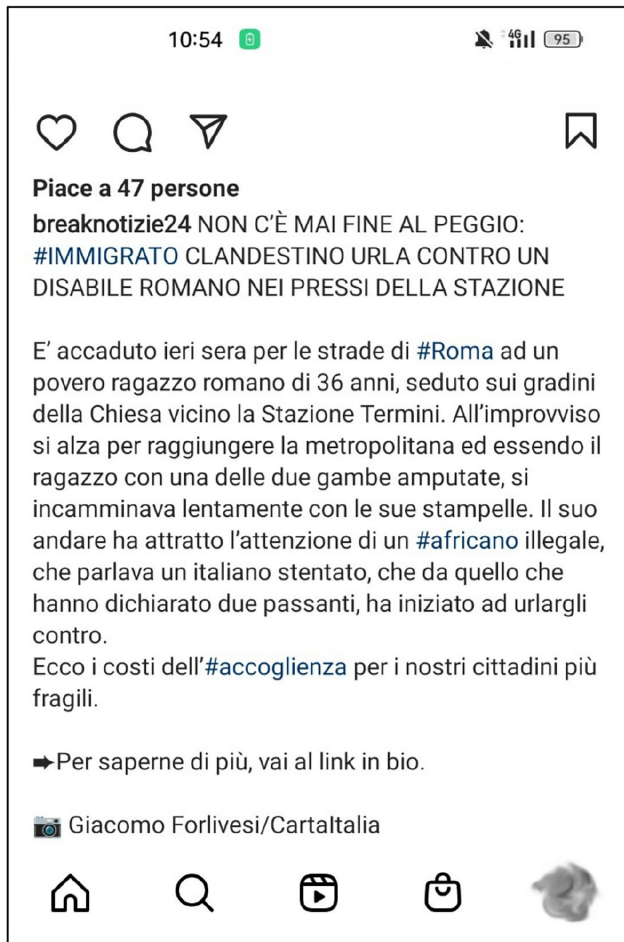
Note. English translation: "IT NEVER RAINS, IT POURS: #ILLEGAL IMMIGRANT YELLS AT A DISABLED ROMAN NEAR THE STATION. It happened last night on the streets of #Rome to a poor 36-year-old Roman man sitting on the steps of the Church near Termini Station. Having gotten up to reach the subway and having one of his two legs amputated, the boy walked slowly with crutches. His awkward walking attracted the attention of an illegal #African, speaking a stunted Italian, who reportedly started yelling at him, according to two passersby. Here are the costs of #welcoming immigrants paid by our most fragile citizens." This stimulus has been edited for publication, and the original study materials can be obtained upon request to the corresponding author. RH = racial hoax. See the online article for the color version of this figure.

In the next phase, "Think about it auntie!" the focus is on developing individual skills useful against racial misinformation. Sofia and the user meet Aunt Susanna, who has just shared a RH on social media. Sofia, supported by the user, tries to argue and explain the concept of media bias (Paul & Elder, 2004), addressing issues such as the presence of stereotypes in the news, the difference between a fact and an assessment, the unilateral or bilateral narrative point of view, and the source of the news. For each media bias, Sofia provides explanations, including: "Stereotypes are characteristics attributed to a person based on a preconceived general opinion associated with a 'different' group from one's own," "Aunt, listen to me: a fact is something that happened, a judgment is what the journalist thinks about someone! There is a big difference, right?," "Every news story has a main point of view on which the journalist focuses, but it is also true that the same event can be seen from different perspectives and have multiple meanings.", "The journalist can use unreliable sources (e.g., gossip) or reliable sources with multiple points of view on the event."

After practicing recognizing such biases in several news stories (Figure 2d), Sofia asks the user to identify them in the RHs: "Would you like to help me make a list of stereotypes in the news story you encountered?" "In the presented news story, can you distinguish between fact and judgment?" "In this case, in this news story, which point of view is described the most?" "What are the sources of this news story?"

At the end of this phase, Sofia, thanks to her friends in the Rolling Minds debunkers group, finds two alternative sources of the same news story (Figure 2e). In these sources, however, the main character (Said, initially described stereotypically and accused of aggression) gives an interview in which he explains his point of view on the incident. This narrative shift inverts the perspective, revealing that his true intent was to assist the disabled person in the RH, not to attack him. He also shares his feelings and thoughts about what is happening. This structure was derived from the literature on mediated intergroup contact (Mutz & Goldman, 2010). Since the primary goal of these counter-stories was to humanize Said and encourage the user to consider his viewpoint as well, the first counter-story focuses on Said's counter-stereotypical description. Said recounts his experiences as a scout and volunteer. In the second counter-story, Said shares his emotions about what happened and clarifies the misunderstanding (Figure 2e). Immediately afterward, the user is asked to freely rewrite the news taking into account both the misleading news and Said's interviews. Lastly, Sofia again asks the same questions as in the first (profiling) phase about contact intentions as well as other psychological variables. At the end of this phase, users again receive feedback based on their ability to recognize stereotypes ("Perfect, you are an outstanding debunker, you recognized stereotypes in the news!" "Promising debunker! You've shown so much effort, but you still haven't uncovered all the stereotypes!").

After the first two phases ("Introduction" and "Nice to meet you, I'm Sofia!"), the participants in the control condition, again with Sofia's help, followed a series of tips and practiced recognizing the online phenomenon of phishing. This is defined here as a set of techniques through which an attempt is made online to deceive the victim by convincing them to provide personal information, financial data, or access codes. In the control condition, there was no form of contact with the outgroup. Once the phishing-recognition exercise was completed, the intention for intergroup contact was measured again.

At the end of both the experimental and control conditions, all participants were given an in-person, detailed debriefing to explain

the objectives of the study, underlining the dangers of racial misinformation in order to avoid the consolidation of possible distorted beliefs developed during the intervention.

Measures

Propensity to Engage in Analytical Reasoning (Cognitive Reflection Test 2 [CRT])

Based on Pennycook and Rand's (2019) suggestions, an abbreviated version of the CRT has been adopted to assess the adolescent's propensity to think carefully through a problem, resisting the urge to rush through an impulsive tendency to give the first plausible answer. For this purpose, a revised version of the CRT-2 (Thomson & Oppenheimer, 2016) was used, and the two items previously found to be most correlated with each other were employed. After the automatic coding of the two items through the CRT machine scoring library *reflectR* (Corbelli, 2024), the responses were dichotomized by assigning 1 point to impulsive-incorrect responses and 2 points to correct responses. Having averaged the two scores, the test results then ranged between 1 (*impulsive-incorrect responses only*) and 2 (*correct responses only*).

Intergroup Contact Intention

Two conversational items, adapted by Cameron et al. (2007), were used to assess the adolescent's contact intentions by directly addressing the subject ("Would you spend your free time with an African boy/girl?" "Would you get friendly with him/her?") to be answered through a 5-point Likert agreement scale ranging from 1 (*strongly disagree*) to 5 (*totally agree*). The same questions, incorporated into the conversation through the web app, were repeated at the end of the socioanalytic intervention.

Analytical RHs Reading (ARHR)

As already tested in previous work (D'Errico et al., 2024), we administered a battery of tasks based on media biases reflection (Paul & Elder, 2004) to calculate an indicative score of the ability to recognize the manipulations in a RH (ARHR index). Each task is structured to encourage the analytical processing of a characteristic of the typical RH.

Five of the proposed tasks included multiple choice questions: recognition of the point of view in the RH, recognition of the point of view in a newspaper headline, recognition of a reliable source, recognition of stereotypes, and newspaper recognition in the RH. Each correct answer was given 1 point. Five other tasks involved open-ended answers, and the responses were coded by two independent judges. For recognition of the source (Cohen's κ = .98) in the RH administered, a value of 1 was given to correct answer identified as "The passers-by"; for the recognition of the fact (Cohen's κ = .74), the correct one was when the person reported the event accurately ("disabled attacked"), and for the recognition of the judgment? (Cohen's κ = .80) the correct answer was evaluative sentences like, for example, "these events occur because illegal Africans are welcomed into the country"; for the recognition of stereotypes (Cohen's κ = .89), the correct answer was the identification of stereotypes like "illegal" or "clandestine"; finally, the participants were asked to find alternative interpretations of the event (Cohen's κ = .82) and the correct

answer could be for instance "maybe the guy was trying to ask him something."

The ARHR index was derived by summing the scores from various subtasks, after standardizing each score to ensure equitable contribution to the composite index. Subsequently, the aggregate sum score was standardized once more to enhance the interpretability of the index.

RHs Rewriting After Mediated Contact

As tested in the previous pilot study (D'Errico et al., 2024), a RH rewriting (RHW) index was calculated by asking the adolescent to rephrase the news item after a mediated contact phase to decrease ethnic bias and increase intergroup contact intention, inspired by the work of Mutz and Goldman (2010). The RHW index is composed of four open-ended response tasks, coded by two independent judges. Again, raw values were standardized before calculating the sum index.

The focus adopted in both the title and the text was coded in the same way (Cohen's κ title = .89, text = .74), with values ranging from 0 = (*same focus and same judgment*) to 3 (*multiple focuses and no judgment*; examples: value 0—"the worst never ends: boy yells at a disabled roman near the station," value 1—"boy shouts at a disabled boy," value 2—"boy at the station shouts at a boy disabled," "elderly person in difficulty: what will be the success?" value 3—"the immigrant tries to help a disabled person but is accused"), and subsequently, the use of stereotypes, coded in the same way for both the title and text (Cohen's κ title = .80, text = .78) with values ranging from 0 indicating the use of negative stereotype (e.g., "illegal immigrants help disabled people in difficulty") to 2 indicating positive stereotype (e.g., "Said, collaborator of the red cross, tries to help a disabled roman in difficulty"), the value 1, however, was used when no form of stereotyping was present (e.g., "fake news in Rome").

Also, in this case, the final composite index was restandardized to facilitate ease of interpretation, ensuring it is centered around a mean of 0 and expressed in units of standard deviation.

Planned Analyses

Initially, descriptive statistics and zero-order correlations for the variables of interest were analyzed. Then, to assess the impact of the socioanalytic intervention on contact intention scores, an analysis of covariance was employed, adjusting for preintervention scores. Concerning the intervention group, skewness and kurtosis were analyzed for each relevant variable, and Mardia's test (1970) was used to examine the multivariate normality assumption. Following this, a path analysis model was fitted to assess the consistency between the theoretically proposed relationships and the observed data; the variables included in the path analysis model are presented in the same temporal order in which they were measured by the web app. All statistical analyses were carried out within the R environment v.4.0.4 (R Core Team, 2021), using the mvnormalTest (Zhang et al., 2022), psych (Revelle, 2022), Hmisc (Harrell Jr., 2019), and lavaan (Rosseel, 2012) packages.

Results

Descriptive statistics and zero-order correlations for the variables of interest are shown in Tables 1 and 2, respectively. In particular, it can be seen that the propensity to engage in analytical reasoning is

Table 1

Descriptive Statistics

Variable	M	SD	Sk	κ
PAR—experimental condition	1.57	0.37	−0.24	−1.17
PAR—control condition	1.71	0.35	−0.80	−0.55
Analytical RHs reading (experimental condition)	0.00	1.00	−0.45	0.01
RHs rewriting (experimental condition)	0.00	1.00	−0.32	−0.70
Contact intentions (experimental condition; before)	2.69	0.95	−0.64	0.26
Contact intentions (experimental condition; after)	2.81	1.03	−0.81	0.28
Contact intentions (control condition; before)	2.70	0.94	−0.28	−0.18
Contact intentions (control condition; after)	2.48	1.00	−0.45	0.39

Note. Sk = skewness; κ = kurtosis; PAR = propensity to engage in analytical reasoning; RHs = racial hoaxes.

correlated with ARHR, RHW, and contact intentions measured before intervention. In addition, ARHR performance shows a positive correlation with RHWs, with contact intention measured after the socioanalytic intervention, and also with the same variable measured before the web app, although to a lesser extent. In contrast, RHW correlates significantly only with contact intention measured after the intervention.

An analysis of covariance was conducted to examine the difference in contact intention scores between the group which underwent the intervention based on conversational storytelling and the control group; the preintervention contact intention score was included as a covariate in the model to adjust for initial differences among participants. The assumption of homogeneity of regression slopes was tested and not violated, $F(1, 235) = 3.81$, $p = .052$, indicating that the relationship between the covariate (preintervention contact intention) and the dependent variable (postintervention contact intention) was consistent across the two levels of the independent variable.

The initial contact intention score was significantly related to the postintervention score, $F(1, 236) = 137.00$, $p < .001$, $\eta_p^2 = .367$. After adjusting for the preintervention score, the analysis showed a significant effect of the intervention on contact intention, $F(1, 236) = 9.83$, $p = .002$, $\eta_p^2 = .040$.

Regarding the properties of the distributions of the variables under consideration for the group which underwent the socioanalytic intervention, it can be seen that the skewness and kurtosis values for each variable are below the ± 2 cutoff. However, Mardia's test for multivariate normality showed a significant violation of the assumption of multivariate normality for skewness (74.79, $p < .01$); for this reason, path analysis was performed with maximum likelihood estimation with robust (Huber-White) standard errors. Concerning the analysis of missing data, the result of Little's test of missing completely at random (1988)

was not significant ($\chi^2 = 8.17$, $p = .15$), thus confirming the existence of missing completely at random mechanisms operating on the variables examined. In accordance with this assumption (Marcoulides & Schumacker, 2013), full information maximum likelihood estimation of parameters was utilized for addressing missing data within the lavaan package (Muthén & Shedden, 1999; Schafer & Graham, 2002).

The plausibility of the hypothesized relationships between variables was confirmed by the fit indices of the proposed model, following the established cutoff values proposed by Kline (2016). Specifically, the comparative fit index, Tucker–Lewis index, root mean square error of approximation, and standardized root mean square residual were used to assess model fit: $\chi^2 = 7.17$, $df = 4$, $p = 0.127$; comparative fit index = 0.98; Tucker-Lewis index = 0.96; root mean square error of approximation = 0.07, 90% confidence interval [CI] [0.000, 0.163], $p = 0.270$; standardized root mean square residual = 0.05. Figure 4 shows the diagram with the standardized parameters.

The model was controlled for age and gender, although neither covariate was shown to have a significant effect on any of the variables considered. The results show that increasing individual propensity to engage in analytical reasoning leads to a significant increase in performance at the analytical reading of RHs ($\beta = .336$, $p < .001$), as well as improved performance at news rewriting ($\beta = .233$, $p = .002$). At the same time, the propensity to engage in analytical reasoning is also positively linked to contact intention before the intervention ($\beta = .339$, $p < .001$). Moreover, as performance in news rewriting improves, contact intention at the end of the socioanalytic intervention also increases. Instead, contact intention measured before the intervention was found to be significantly linked only to the same variable assessed after the intervention ($\beta = .656$, $p < .001$).

The indirect effect of the performance at the analytical reading of RHs on contact intentions through the performance in news

Table 2

Zero-Order Correlation Matrix

Variable	1	2	3	4	5	6	7
1. Gender	—						
2. Age	−.13*	—					
3. Propensity to engage in analytical reasoning	−.13*	−.02	—				
4. Analytical RHs reading	.06	−.10	.34***	—			
5. RHs rewriting	.11	.00	.38***	.52***	—		
6. Contact intentions (before)	−.09	.06	.22***	.26**	.14	—	
7. Contact intentions (after)	−.01	.01	.09	.34***	.26***	.60***	—

Note. Analytical RHs reading and RHs rewriting correlations apply only to the intervention group. RHs = racial hoaxes.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Figure 4

Path Diagram: Robust Maximum-Likelihood Parameter Estimates for the Hypothesized Model
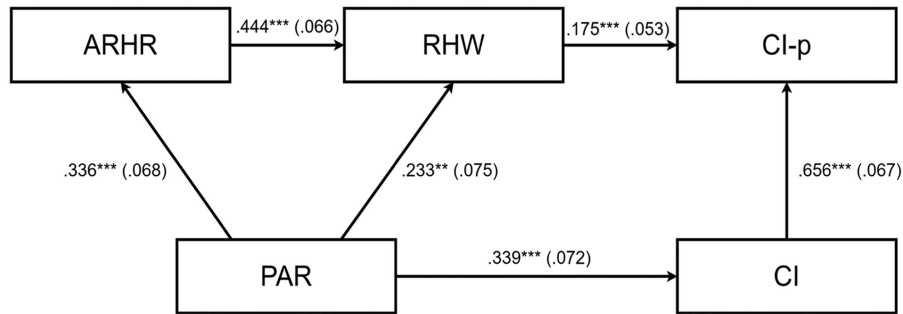
Note. The displayed estimates are the standardized coefficients. Standard errors are shown in parentheses. ARHR = analytical RH reading; RH = racial hoax; RHW = RH rewriting; CI-p = contact intention (post-intervention); PAR = propensity to engage in analytical reasoning; CI = contact intention.
** $p < .01$.   *** $p < .001$.

rewriting was estimated with 95% confidence intervals using the bias-corrected bootstrap method with 10,000 samples (MacKinnon et al., 2004). The results show a significant indirect effect: 0.078 (0.028), 95% CI [0.023, 0.132].

Discussion

The results of this study confirm our hypothesis that the activation of socioanalytical processes through conversational approach can promote intentions to engage in contact with individuals belonging to stigmatized groups subject to discrimination, such as immigrants, when adolescents deal with RHs. In particular, the recognition of distorted elements within RHs (Lutzke et al., 2019; Paul & Elder, 2004) and the adoption of an alternative perspective through mediated contact (Mutz & Goldman, 2010; Visintin et al., 2017), namely the humanized perspective of the discriminated target, increased intergroup contact intentions. These results are in line with studies emphasizing the importance of recognizing the biases of the RH through guided analytical reading (Lutzke et al., 2019; Paul & Elder, 2004) in countering gullibility and reducing vulnerability to misleading or false news during adolescence. Yet, these analytical reading processes are not directly associated with contact intentions after intervention but are mediated by RHW after indirect contact with the target of racial misinformation (i.e., Said). As suggested by literature on mediated contact in countering the negative effects of prejudice and stereotypes (e.g., Visintin et al., 2017), our intervention model also took into account the perspective of those who are the designated targets of racial misinformation. The inclusion of this aspect through mediated contact (i.e., Said's alternative point of view), which represents an important element to include in the cognitive reprocessing of the RHs, can increase psychological closeness with potential victims of online discriminatory acts (Banas et al., 2020; Mutz & Goldman, 2010), countering the heuristic process of generalizing a presumed attribute of a group to all its members. In our intervention, the adoption of a "humanized" social cognitive process transfers the effect of analytical processes on contact intention. This means that the more adolescents engage in analytical cognitive processes aimed at deconstructing and checking online news, the more inclined they will be to extend their "humanized" social cognitive perspective. Moreover, the more adolescents expand their social and cognitive horizons—by

including the perspective of discriminated targets through mediated contact—the more inclined they will be to engage in contact with individuals belonging to stigmatized groups.

The effect of socioanalytical processes through mediated contact is also observed when compared with the control group and even when controlling for initial levels of propensity for analytical reasoning. This result suggests that merely assessing whether adolescents are more or less inclined to engage in reflective reasoning may not be sufficient to counteract the effects of racial misinformation on adolescents' social behaviors toward marginalized groups. When designing an intervention, it is necessary to understand how different elements (e.g., source reliability and recognition of stereotypes) can influence the social and cognitive processes activated by RHs. While cognitive reflection may support more careful and aware reasoning, specific interventions should enable adolescents to (a) recognize possible distorting elements contained within RHs and (b) adopt a perspective on phenomena that goes beyond the piece of news read. Therefore, both cognitive and social aspects could protect against the effects of misinformation and promote inclusive and antidiscriminatory behaviors, regardless of the level of adolescents' reflective maturity.

Another aspect to emphasize in this contribution is the implementation of the intervention using a conversational approach, which could be helpful in engaging and motivating adolescents (Kang & Gratch, 2011; Schuetzler et al., 2018; Veletsianos & Russell, 2014). The engaging technological interaction based on the conversational model could represent a valuable educational resource, particularly for those who are more susceptible to misinformation. It is plausible that interaction with a motivating peer conversational agent facilitated the activation of sociocognitive processes (Veletsianos & Russell, 2014) not only in adolescents more inclined to reflective reasoning but also in those who are not and who are more likely to be influenced by distorted and fake news, as suggested by recent findings (Pennycook & Rand, 2019). The use of a conversational approach is also consistent with recent literature demonstrating the benefits of such an educational/technological approach to engagement and concentration (Gulz et al., 2011). Moreover, the potential of these types of applications, which allow adolescents to practice in simulated contexts, is recognized in actively building situated knowledge of the individual's decision-making processes, even

when addressing the complexity of social judgment (Schrier, 2019). Additionally, through the conversational agent approach, it would be possible not only to collect data but also to engage adolescents in a conversational meta-reflection that occurs during virtual social interactions with peer-educator agents.

Overall, the results of this study suggest the adoption of targeted intervention procedures to counteract racial misinformation and its effects by integrating multiple perspectives: cognitive, social, and technological. The integration of these approaches could be useful for training and developing cognitive and social skills using engaging interactive technologies tailored to adolescents.

Conclusion, Implications, and Limitations

The results of this study can provide information and contribute to the literature on interventions addressing racial disinformation and its effects during adolescence, which is still understudied compared to interventions targeted at adults. Today's adolescents, unlike previous nondigital generations, are constantly connected with others and online social information through the use of interactive technologies. We believe that it is possible to constructively use interactive technologies not only to capture adolescents' attention but also to support the more meta-reflective processes that are maturing during this sensitive phase of life.

Specifically, in this study, through a conversational approach, it has been possible to design educational interventions that promote the analysis of information encountered online and raise awareness about the possible stories and perspectives of individuals who are the victims of misinformation. This type of intervention could integrate and expand on previous ones by highlighting the educational value of technologies. It incorporates aspects of gentle activation and nudging of analytical reasoning processes (Tegos et al., 2015), as well as aspects aimed at engaged and active user involvement (D'Errico et al., 2024) in psychosocial issues related to misleading news. Educational interventions can be initiated in classrooms by teachers who, influenced by their interaction with Rolling Minds, can stimulate students to identify additional examples of media biases or misleading news they have encountered. Teachers could also encourage students to consider different stereotypes and urge them to envision the story from the perspective of an outgroup member, thereby reinforcing the positive effects of the web app. The involvement of teachers in the debriefing at the end of Rolling Minds sessions aligns with the potential for these interventions to be replicated in classroom settings.

Notwithstanding the merits of this methodology for understanding how to counter racial misinformation, the study has some limitations, including not considering additional aspects that could intervene in the process and not conducting a follow-up to assess the duration of its positive effects. It is important to note that our intervention significantly increases intergroup contact intention, although the effect size is small. For future studies, we suggest enhancing the impact of our socioanalytic intervention by extending its duration, such as by engaging teenagers with multiple instances of fake news. Additionally, strengthening the intervention could involve more comprehensive analysis of its concurrent and longitudinal effects by expanding the sample size and incorporating variables such as empathy. It would also be important to test the cross-cultural validity of the intervention by exploring the sociodemographic context (e.g., sample composition, other cultures, countries in Eastern Europe more exposed to misinformation, or with higher levels of conservatism). Additionally, it would

be important to explore whether this type of intervention could be applied in relation to the prevention of racial discrimination, as well as discrimination based on sexual orientation and other topics.

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