



Review of Methods for Reducing Prejudice and in-Group Bias

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ABSTRACT

The intergroup bias makes us to place a greater value on our group members than other group members. In society, people sort themselves into groups and sometimes they label other groups as weak and incompetent. In some situations, minority groups are viewed as threats by majority groups when they differ too much from them. The effects of such attitudes and behaviors can be profound on society and communications, and lead to discrimination against outgroups and a social division. In this study, we review literature in this area in order to find practical ways to reduce prejudice and in-group bias. We discuss related influencing factors such as intergroup contact, intergroup acceptance, intergroup similarities, social norms, status of a group, and size. This study provides some significant takeaways include the relationship between anxiety and in-group bias and our tendency to behave less prejudiced in times of confidence and less stress; as well as the effect of revealing intergroup similarities through education and social media. Other procedures are also listed that can be used by everyone especially policymakers and researchers to find and develop effective approaches to improve societies by overcoming in-group bias. Other methods are also listed that can be used by everyone especially policymakers and researchers to find and develop effective approaches to improve societies by overcoming in-group bias.

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Introduction

As human societies developed over six million years ago, social interaction became a cornerstone of survival and reproduction (Massey, 2002). From an evolutionary perspective, living in communities was essential, but the inherent differences between individuals presented challenges in forming cohesive groups. To overcome these, people naturally aligned themselves with those who shared similar attributes (Krebs & Denton, 1997). This led to the emergence of various multicultural societies, categorized by factors such as nationality, age, gender, and more. Over time, the differences in power, status, and other social divisions became more pronounced, complicating communication and fostering cognitive biases between groups.

In modern times, these intergroup biases manifest in widespread issues of prejudice and discrimination. Movements such as Black Lives Matter highlight the global urgency of addressing these issues (Barbot, 2020). However, the problem of discrimination is not limited to race and ethnicity; age, gender, and religion also face similar challenges. For instance, the marginalization of the elderly, discrimination against women and sexual minorities, and the repression of religious groups all emphasize the importance of improving intergroup relations. Can understanding the mechanisms behind intergroup communication influence how we treat others? Can our attitudes change by identifying strategies that improve these relations? Over six decades of research have contributed to a vast body of social psychological studies on intergroup relations (Allport, 1954; Tajfel, 1970). Among these, one of the well-studied biases is in-group bias, the tendency to favor one's own group over others. This bias affects behavior in various ways, manifesting in discriminatory attitudes such as prejudice, and cognitive processes like stereotyping (Mackie & Smith, 1998; Wilder & Simon, 2001).

Intergroup bias can manifest at multiple levels, from neural responses associated with face encoding and emotional processing to reduced social interactions with outgroup members (Kawawakami, Amodio & Hugenberg, 2017). Understanding these variations in response is essential because they directly impact social dynamics. Furthermore, the complexity of societal structures, intertwined with economic and legal considerations, poses significant challenges for policymakers seeking to enact change (Lee & Ottati, 2002).

By designing and testing interventions that target these biases, we can better understand and mitigate the effects of prejudice and favoritism. This paper aims to contribute to this goal by categorizing key methods and procedures that address the most critical factors in modifying intergroup bias, ultimately working toward reducing its negative impact on society.

Intergroup contact

To address in-group bias, it is essential to examine whether communication between in-groups and out-groups reduces or reinforces prejudice. Does social interaction among members of different groups diminish bias, or could it potentially amplify it? While many studies have highlighted the benefits of intergroup contact in reducing prejudice (Dovidio, Glick, & Rudman, 2008; Pettigrew & Tropp, 2013), some research suggests that these outcomes may not apply uniformly to all out-group members (Amir, 1976). This section will explore the types of intergroup contact and conditions that effectively reduce bias.

Intergroup contact refers to social interactions between members of diverse groups and is considered a powerful tool for reducing in-group bias across various dimensions, including race, ethnicity, age, and gender (Pettigrew & Tropp, 2006; Pettigrew, Tropp, Wagner, & Christ, 2011; MacInnis & Page-Gould, 2015). In intergroup relations research, two terms are commonly used: "intergroup interaction" and "intergroup contact." Although these terms both refer to social exchanges between different groups, they yield different effects on in-group bias due to several factors: 1) measurement tools, 2) experimental conditions, 3) the number of group members involved, and 4) the settings in which interactions occur. Studies show that intergroup

interaction can induce stress and anxiety, whereas intergroup contact tends to reduce intergroup anxiety and foster more positive attitudes (MacInnis & Page-Gould, 2015).

Research indicates that intergroup contact, both on an individual and contextual level, can reduce prejudice not only among racial and ethnic groups but also across gender and generational divides. Intergroup contact can mitigate both implicit and explicit forms of discrimination. Interestingly, even living near a minority community, without direct interaction, can decrease prejudice (MacInnis & Page-Gould, 2016). The frequency of contact between group members is also crucial in fostering more favorable attitudes toward out-groups (Brown et al., 2007).

Certain conditions enhance the effectiveness of intergroup contact, six of which are summarized below:

Table 1: Key factors in optimizing intergroup contact

Influencing Factors	Sources
Equal status during contact and supportive social norms	Dovidio et al., 2003
Familiarity with out-group members	Amir, 1976; Brewer & Miller, 1984
Expansion of intergroup friendships	Pettigrew, 1998
Intergroup cooperation, common goals, support of authorities	Allport, 1954, 1958
Learning about the out-group, building emotional ties, and reappraising in-group biases	Pettigrew, 1998
Trust and forgiveness in intergroup settings, including ethnic minorities, LGBTQ+, and people with disabilities	Pettigrew, 2011

Another group that can benefit from intergroup contact is different generations. Intergenerational interactions can reduce ageism and improve attitudes toward older adults (Hale, 1998; Iweins, Desmette, Yzerbyt, & Stinglhamber, 2013; Tasiopoulou & Abrams, 2006). Cadieux, Chasteen, and Packer (2017) examined the role of inclusion of out-group in the self (IOS) in intergenerational contact and suggested that a key mediator in these interactions is increasing the cognitive association between the self and older adults. They found that ageist attitudes can be mitigated when contact addresses competence-related stereotypes, rather than solely focusing on increasing warmth.

Types of Intergroup Contact

Intergroup contact extends beyond direct communication; indirect forms of contact can also effectively reduce in-group bias. Indirect contact influences attitudes toward out-group members by altering perceptions of in-group norms and reducing intergroup anxiety (Tezanos-Pinto et al., 2010). Generally, indirect interactions can be categorized into four main types:

1. **Extended Contact:** This concept, first introduced by Wright et al. (1997), suggests that learning about a close friendship between an in-group member and an out-group member can reduce prejudice (Turner et al., 2008; Gómez, Tropp, & Fernández, 2011; Vezzali et al., 2014; Zhou et al., 2019).
2. **Vicarious Contact:** People can experience less in-group bias simply by observing positive relationships between in-group members and out-groups. Observing such interactions helps shift attitudes toward out-groups (Vezzali et al., 2014; Liebkind et al., 2019; Vezzali et al., 2019; White et al., 2020).

3. **Imagined Contact:** This refers to the mental simulation of intergroup contact (Crisp & Turner, 2009), which has been shown to reduce discrimination in situations where direct contact is not possible. Imagined contact can mimic the effects of real interactions by decreasing anxiety and fostering positive perceptions between groups (Turner, Crisp, & Lambert, 2007; Vezzali et al., 2012; Stathi et al., 2020; White et al., 2020).
4. **Online Contact:** In today's digital age, online interactions offer a new avenue for intergroup contact. Virtual communication between distinct group members can promote goal-oriented, cooperative exchanges, fostering mutual understanding and reducing biases (Lemmer & Wagner, 2015; Boccanfuso, White, & Maunder, 2020; White, Maunder, & Verrelli, 2020).

Out-group acceptance

Out-group acceptance, like intergroup contact, plays a crucial role in reducing prejudice. It involves the feelings of support, shared belonging, and social connections between members of different groups (Kunstman et al., 2013). It also encompasses positive attitudes towards out-groups (Mepham & Martinovic, 2018). When individuals feel accepted by out-group members, their internal motivation to respond without prejudice (IMS) and their willingness to engage in intergroup interactions increase. This sense of acceptance not only improves motivation to reduce bias but also enhances overall intergroup relations.

Out-group acceptance enables individuals to perceive positive information about other groups and receive favorable interpersonal feedback, fostering more inclusive and affirmative attitudes. While both high-status and low-status group members can benefit from out-group acceptance (as discussed in the section on group status), it can have a more significant impact on the behaviors of high-status and majority group members towards others (Bergsieker, Shelton, & Richeson, 2010).

A practical example of out-group acceptance can be observed in age and national groups. Studies show that when individuals accept the cultural rights of immigrant groups, it leads to more positive perceptions of out-groups and reduces in-group favoritism. This acceptance fosters a shared sense of attachment, particularly when out-groups' rights are framed as complementary to those of the broader national category (Verkuyten, Martinovic, & Smeekes, 2014).

Multilingualism and out-group acceptance

Cognitive flexibility, which develops from speaking multiple languages, is a valuable asset in promoting acceptance. Multilingual individuals tend to be more open-minded and tolerant of differences, which enhances their ability to accept and maintain positive attitudes toward members of other groups. Multilingualism helps people perceive national identities as more inclusive, as their broader understanding of cultures and nationalities allows them to identify commonalities and connections with others (Collins & Clément, 2012).

While the relationship between multilingualism and out-group acceptance is generally positive, there are exceptions. For instance, in the Netherlands, where many individuals speak multiple languages fluently, there is a tendency to harbor negative attitudes toward immigrant groups with limited language proficiency. Dutch speakers often believe that language acquisition is not as difficult as some immigrants perceive it to be. As a result, they may view immigrants' inability to communicate fluently in a foreign language as a sign of incompetence rather than ability, leading to a reluctance to accept them (Mepham & Martinovic, 2018).

Time effect

In addition to contact and acceptance, time plays a crucial role in moderating in-group bias. Does spending time together improve relationships and reduce prejudice, or does it reinforce existing biases? Can intergroup favoritism diminish over time, or does it remain unchanged? Two significant studies offer insights into these questions. The first, conducted in 1999, explored how communication over time impacts in-group bias by examining factors such as anxiety, uncertainty, social identity, and individual identity. Over four interaction periods, participants from different ethnicities or nationalities were paired and asked to get to know each other, then reflect on their experience in written form. The results showed that as time passed, both anxiety and uncertainty were reduced, leading to improved communication quality. However, there was no significant relationship between time and changes in social or personal identity, indicating the resilience of social identity across the communication periods (Hubbert, Gudykunst, & Guerrero, 1999).

A second study focused on the intergroup sensitivity effect (ISE), which refers to the tendency to react more negatively to criticism from out-group members than from in-group members. Conducted in two trials over a four-week interval, the study found that despite the passage of time, ISE remained unchanged. Even when participants could not recall the source of criticism, their defensiveness against out-group opinions persisted, demonstrating that ISE is a long-term phenomenon that does not easily diminish (Hiew & Hornsey, 2010).

These findings suggest that while time can improve communication and reduce anxiety, deeply ingrained social identities and biases—such as intergroup sensitivity—are less likely to fade with time alone. Those seeking to influence attitudes or foster social change must recognize the enduring nature of these biases and consider strategies beyond simply increasing contact over time.

Anonymity

Anonymity plays a unique role in shaping group dynamics, as it reduces perceived dissimilarities between individuals and fosters a stronger sense of group cohesion. The *social identity model of deindividuation effects* (SIDE) offers an explanation for the complex impact of anonymity on group behavior, differentiating between two key effects: the anonymity of in-group members to oneself and the anonymity of oneself to the group.

The anonymity of in-group members to the self enhances the perception of group unity by minimizing personal differences, thus increasing group salience. When individuals are unable to distinguish the unique characteristics of other group members, they tend to view the group as more cohesive. On the other hand, anonymity of the self to the group can increase a sense of separation, as individuals are more aware of their distinctiveness from the group (Sassenberg & Postmes, 2002).

Anonymity, in general, can reduce prejudice by emphasizing group identity over individual distinctions. For example, people who lack knowledge of the specific attitudes of religious individuals tend to express less prejudice toward them. Religious Jews and Muslims have been found to express reduced prejudice toward each other in anonymous settings, and teachers are less likely to judge difficult students negatively when interacting anonymously online (Schumann et al., 2017). Moreover, anonymity lowers anxiety by boosting confidence, allowing individuals to share their views without fear of judgment or retaliation from out-groups (Amichai-Hamburger & McKenna, 2006).

Intergroup similarity

Perceived dissimilarity is a key factor contributing to out-group discrimination, as individuals often view attitudinal differences between their group and others as threatening. This is especially true when minority groups are seen as differing significantly from the majority,

leading to heightened intergroup tension (Van Osch & Breugelmans, 2012). One critical dimension of this phenomenon is *attitude similarity*, which refers to sharing common values and beliefs within one's group. Varying levels of this homogeneity can shape intergroup relations in multiple ways (Brown, 1984).

When people focus on similarities within their own group, it can amplify their perception of differences with out-groups, thereby increasing prejudice and discrimination (Diehl, 1988; Brown & Abrams, 1986). Those who align with the majority's opinions tend to receive more respect and appreciation, while individuals with divergent views face a higher risk of rejection (Rohmann, Piontkowski, & van Randenborgh, 2008). As a result, greater similarity with majority group members often fosters stronger favoritism, more biased judgments, and increased prejudice toward out-groups (Taillandier-Schmitt & Combalbert, 2020).

However, when similarities between in-group and out-group members are emphasized, particularly in non-competitive contexts, this focus on commonalities can reduce intergroup bias and discrimination (Byrne & Wong, 1962; Rokeach & Mezei, 1966). In these cases, individuals may redefine their group identity based on shared beliefs, promoting greater inclusion (Moghaddam & Stringer, 1988). In contrast, during competitive situations, similarity tends to reinforce group distinctiveness and rivalry (Brown, 1984).

Individual identification plays a moderating role in the relationship between similarity and intergroup attitudes. According to *social identity theory*, people derive their self-concept from the social groups they identify with. Those who perceive more similarities within their group are more likely to exhibit in-group favoritism and out-group derogation (Turner & Reynolds, 2010). Consequently, changes in identification can influence both the intensity of in-group favoritism and the willingness to engage with out-group members (Roccas & Schwartz, 1993; Lopes, 2010).

As group identities shift, attitudes and beliefs also evolve, eventually influencing social norms. These norms, in turn, can contribute to reducing discrimination, which is explored in the next section.

Group norms

The social environment we grow up in is shaped by informal rules, known as *social norms*, which guide behaviors and beliefs, encouraging some actions while discouraging others. Social norms have a powerful influence on attitudes and actions; when society disapproves of certain behaviors, people are less likely to engage in them, and when it promotes others, these behaviors become more common. According to Pettigrew (1958), group norms are particularly influential in shaping discriminatory behavior. These norms define the beliefs, attitudes, feelings, and behaviors expected of group members, with the primary goal of increasing in-group cohesion and reducing intergroup differences. In doing so, group norms impact how individuals see themselves, leading them to act, think, and feel as part of the group (Kelly & Setman, 2020).

When situational factors highlight in-group norms, whether in small or large social groups, these norms can reinforce in-group judgments. Moreover, when group norms are particularly salient, their influence is even more pronounced. Research shows that when in-group norms are not explicitly known, individuals tend to evaluate out-group members more leniently than when these norms are clearly defined (Marques et al., 1998).

Interestingly, people tend to follow group norms more than they realize (Cialdini, 2007), often underestimating how deeply norms shape their behaviors. Unlike overt social pressures, group norms influence individuals at the level of self-definition (White et al., 2009). When group members deviate from these norms, they may weaken the group's cohesion and risk social rejection (Abrams et al., 2000). People follow norms for various reasons: to feel a sense of

belonging, to avoid social rejection, and to gain social approval. In general, individuals behave in line with social norms, showing more racial tolerance when tolerance is socially supported and more prejudice when such attitudes are endorsed (Blanchard et al., 1994; Crandall, Eshleman, & O'Brien, 2002).

Social norms can also shape religious groups. When a group's norms support prejudice, members may discriminate against individuals from other religious groups (Griffin, Gorsuch, & Davis, 1987). The stronger group members' beliefs in stereotypes and adherence to in-group norms, the more aggressively they defend against deviations and resist changes to these norms. This demonstrates that social norms can play a crucial role in moderating negative overgeneralizations and shaping intergroup relations (Crandall & Eshleman, 2003; Smith & Louis, 2008; De Tezanos Pito, Bratt, & Brown, 2010).

In intragroup contexts where boundaries are not clearly defined, individuals respond sensitively to both pro-norm and anti-norm deviations. Pro-norms are those who strongly support group norms but may be judged negatively within the group, while anti-norms are those who reject the norms. These behaviors are more harshly evaluated in intergroup settings. For example, individuals are more likely to act aggressively toward out-group members who follow the norms, while they are more accepting of out-group members who defy those norms. This reflects the sentiment, "My enemy's enemy is my friend," and research shows that people tend to protect in-group pro-norms while welcoming out-group opposition (Abrams et al., 2001). Even when norms are unclear, group members often try to persuade deviants to conform to in-group values (Marques, Abrams, & Serôdio, 2001).

Several factors can amplify the impact of group norms on behavior:

1. *Alignment* with group values (Smith et al., 2012),
2. Group members' *ideology, environmental preferences, and community characteristics* (Costa & Kahn, 2013),
3. Norms being *explicit and clearly defined* (Lambert et al., 1996; Wilson, Lindsey, & Schooler, 2000),
4. *Liberalism, egalitarianism, humanitarian values,* and sympathy for the underdog (Crandall & Eshleman, 2003),
5. *Collective guilt* for past injustices (Powell, Branscombe, & Schmitt, 2005).

Some strategies that can strengthen the effect of group norms on reducing discrimination include:

1. **Education:** Raising awareness of social processes can help inhibit discriminatory behaviors and prejudice (Crandall & Eshleman, 2003).
2. **Media interventions:** Positive portrayals of out-groups, such as stories about interethnic marriage, empathy, and cooperation, can shape public perceptions favorably (Paluck, 2009).
3. **Social influence methods:** Encouraging public commitment, using social networks to spread information, and providing feedback based on "group-shared beliefs" can increase conformity to pro-social norms (Abrahamse & Steg, 2013).

Group status and group size

After examining various intergroup processes and factors shaping group members' attitudes, it's essential to discuss two key features of groups: *status* and *size*. Both significantly influence intergroup relations and the dynamics of bias and favoritism.

Group status

When groups differ in status, tensions between them intensify, making efforts to unite or integrate these groups more difficult (Seta, Seta, & Culver, 2000). The highest levels of in-

group bias are often observed among high-status minorities (Liebkind, Henning Lindblom, & Solheim, 2008). In situations where status is a prominent factor, high-status groups are more likely to exhibit strong in-group bias, while low-status groups display less favoritism and prejudice (Reichl, 1997). Additionally, members of high-status groups report a closer psychological connection to their in-group, whereas low-status members tend to feel a greater affinity toward out-groups (Li et al., 2021). This psychological distance often reduces the likelihood of low-status groups forming unified, mutually intentional coalitions with high-status groups (Seta et al., 2000).

However, there are situations where low-status groups demonstrate higher levels of favoritism than expected (Guimond, 2000). For example, resource distribution can alter intergroup favoritism. Low-status groups often seek to improve their status by competing for resources, highlighting their distinctiveness, and striving for fairness. In doing so, they attempt to elevate their group's standing and surpass out-groups (Rubin, Badea, & Jetten, 2014). This can be seen in how low-status groups, such as people with disabilities, favor in-group members, despite being viewed unfavorably by others (Guimond, Dif, & Aupy, 2002).

The *stereotype content model* also illustrates how group status influences perceptions of competence and warmth. High-status groups are typically associated with competence but are perceived as less warm, while low-status groups are often seen as warmer but less competent (Cuddy, Fiske, & Glick, 2008; Oldmeadow & Fiske, 2010).

Group size

When all other factors are equal, smaller groups tend to exhibit stronger in-group favoritism and mutual support than larger groups (Hewstone, Rubin, & Willis, 2002). In contrast, members of larger groups tend to show more discrimination against smaller groups. For instance, high-status majorities are often more biased toward ethnic minorities (Leonardelli & Brewer, 2001; González & Brown, 2006).

In multilingual societies, group size plays a significant role in shaping members' sense of belonging and is reflected in language use. Majority group members tend to describe themselves using positive terms and higher levels of abstraction, while using more negative terms when referring to minority groups. Similarly, minority members show in-group linguistic bias and out-group derogation (Moscatelli, Hewstone & Rubini, 2017).

Smaller, lower-status groups often feel insecure when interacting with majority groups and may feel compelled to communicate mainly within their own group to avoid rejection (Simon, Aufderheide, & Kampmeier, 2001). High-status groups, on the other hand, identify more strongly with their in-group and value their distinctiveness. This leads to greater resistance to re-categorization, as high-status members seek to protect their interests and maintain their power. They often resist forming connections with low-status groups to avoid losing their identity or privileges (González & Brown, 2006).

Smaller, low-status groups, whose identities are more fragile, are more likely to pursue *re-categorization*. They seek to enhance their self-esteem by affiliating with privileged groups. Meanwhile, high-status groups engage in *status-protection behaviors*, reinforcing favoritism and resisting any changes that could diminish their identity or power.

Effectively communicating with group members and persuading them to adopt behaviors that reduce in-group bias is crucial. The success of these efforts depends largely on *who* delivers the message and *how* it is conveyed—topics that will be explored in the final section.

In-group messaging

To effectively communicate the ideas discussed so far to group members, it is crucial to carefully consider both the content of the message and the credibility of the messenger. The success of persuasion depends not only on *what* is communicated but also on *who* delivers the message.

When attempting to change attitudes, messages that are concise, clear, and based on valid reasoning have more persuasive power than those that are vague or misleading. In the context of in-group issues, firm and assertive statements from within the group are far more convincing than weak ones. Conversely, neither strong nor weak messages from out-group members hold much sway over the group (Mackie, Worth, & Asuncion, 1990). However, when the content of the message is unrelated to in-group attitudes, messages from both in-group and out-group members are equally persuasive. But when the issue is directly linked to the group's core concerns, messages from in-group members carry significantly more weight.

This is largely due to people's preference for similarity. When individuals perceive their issues as aligned with the attitudes of their in-group, they are more likely to find in-group messages compelling. This similarity fosters a sense of understanding, certainty, and familiarity (Faraji-Rad, Samuelsen, & Warlop, 2015). In contrast, out-group messages are less influential because of the perceived dissimilarity, which creates a psychological distance (Wyer, 2010).

Finally, people are more likely to recall messages delivered by in-group members than those from outside the group. This tendency to remember and trust in-group communications reinforces the persuasiveness of internal messaging (Mackie et al., 1990; Turner et al., 1991, 1994).

Conclusion

Based on our literature review and analysis of research findings, we have identified several key elements that can effectively influence in-group bias. These insights are particularly relevant for policymakers and researchers:

1. **Reducing Anxiety and Stress:** Lowering anxiety and stress levels can significantly decrease in-group bias. When individuals feel safe and secure, they tend to exhibit less prejudice. Our review highlights the effectiveness of anonymity, spending time together, and facilitating direct and indirect contact among intergroup members as strategies to reduce anxiety. By creating opportunities for both direct and indirect intergroup interactions in anonymous settings, we can effectively diminish in-group bias. Additionally, techniques from the anxiety reduction literature can be explored to develop new methods for promoting this reduction.
2. **Re-identification Process:** Emphasizing similarities between groups can play a crucial role in reducing in-group bias over time. By highlighting shared characteristics and fostering a re-identification process, we can reshape individuals' perceptions of each other. This can be achieved through the promotion of social norms and educational initiatives, particularly via social media, to showcase the commonalities among diverse groups. Demonstrating these similarities is vital for encouraging anti-racism and non-judgmental behavior.
3. **Enhanced Intergroup Contact:** Increasing interactions between different social groups—whether through direct contact in shared communities or indirect exposure via social media—can effectively reduce both implicit and explicit discrimination.

4. **Fostering Belonging and Acceptance:** To cultivate a sense of belonging, it is essential that members of different groups meet each other's needs. Integrating the rights of out-group members within national frameworks can enhance the perception of shared attachment between groups.
5. **Language Learning:** One of the numerous benefits of learning a new language is its capacity to enhance acceptance and tolerance among group members, while simultaneously making individuals more acceptable to others.
6. **Valuing Competence in Elders:** By recognizing and valuing the competence of older individuals in daily interactions, we can mitigate ageism and ensure that elders are judged based on their knowledge and expertise. This approach can similarly be applied to various groups, including those defined by race, ethnicity, or gender.

Finally, for these messages to resonate effectively, they must be relevant to the audience's group. The communication should be clear, valid, and ideally delivered by someone within the group, particularly in high-status groups that may resist re-identification and feel a stronger connection to their in-group.

Declarations

Author Contributions

Conceptualization, AHV & SHR; validation, AHV; resources, SHR; data curation, SHR; writing—original draft preparation, SHR & AHV; writing—review and editing, AHV; project administration, AHV.

Data Availability Statement

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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Ethical considerations

This study was conducted in full compliance with ethical guidelines and principles. All participants provided informed consent, and their confidentiality and anonymity were strictly maintained. The research protocol was reviewed and approved by the relevant ethical committee, ensuring adherence to ethical standards throughout the study.

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Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this research.

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