frontiers | Frontiers in Behavioral Economics

TYPE Original Research
PUBLISHED 04 February 2025
DOI 10.3389/frbhe.2025.1494271

OPEN ACCESS

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RECEIVED 10 September 2024
ACCEPTED 10 January 2025
PUBLISHED 04 February 2025

CITATION
Senn S, Mutzner N, Oberhauser V and Rauhut H (2025) Individualism: the end of social cohesion? The effects of inequality and group identity on cooperation.
Front. Behav. Econ. 4:1494271.
doi: 10.3389/frbhe.2025.1494271

Individualism: the end of social cohesion? The effects of inequality and group identity on cooperation

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Introduction: Global challenges like pandemics and climate change are fundamentally cooperation problems, where individual interests often conflict with the collective good. Rising economic inequality and individualism are believed to erode social cohesion and cooperation, exacerbating these tensions. Public goods games (PGGs) are widely used to study cooperation in scenarios of unequal resource distribution, but findings on the effects of inequality remain inconsistent, partly due to varied applications of heterogeneity across studies.

Methods: This study introduces a novel research design that directly compares collectivistic and individualistic groups to examine the combined effects of individualism and inequality on cooperation. Groups were exposed to different resource distribution conditions, including both equal and unequal distributions, and their cooperation rates were measured.

Results: The findings reveal no significant differences in cooperation rates between collectivistic and individualistic groups. However, groups with higher inequality exhibited significantly higher cooperation rates than those with equal resource distributions. Notably, heterogeneous groups showed considerable variation in their success at establishing cooperation. Further analysis indicates that the willingness to reduce initial inequality served as a strong signal, enhancing group identity and fostering cooperation.

Discussion: The results suggest that in contexts where group identity is strong, inequality can act as a coordination mechanism, enabling groups to distribute the burden of collective costs more effectively and enhancing overall cooperation. These findings challenge the assumption that inequality inherently undermines cooperation and highlight the potential for strategically leveraging inequality in contexts characterized by collectivistic norms.

KEYWORDS

cooperation, inequality, public goods game (PGG), individualism, collectivism, group identity, resource distribution, heterogeneity

1 Introduction

Many of the most pressing challenges we face today can be understood as cooperation problems. For instance, while there are numerous alternatives to flying or consuming meat products that could help mitigate climate change, encouraging widespread adoption of these climate-friendly behaviors remains difficult. An intact climate functions as a public good—everyone benefits from it, regardless of their individual contributions to reducing

CO_2 emissions. This leads to individual interests often being at odds with collective interests, resulting in a destruction of important public goods, which is suboptimal for society as a whole. What makes these large-scale cooperation challenges even more daunting is that they are often globally rooted and affect nearly everyone in society. As a result, individuals from diverse cultural, socioeconomic, and personal backgrounds must come together, which can create significant challenges in aligning efforts to address these problems effectively. Most of the present cooperation problems therefore also involve a great amount of heterogeneity between the participating parties, especially as economic inequality has been on the rise in the past years (Xu and Marandola, 2023). In fact, more unequal societies tend to show various undesirable social outcomes such as reduced economic growth (OECD, 2015), more violence (Pickett and Wilkinson, 2015) and lower life-expectancies (Bor et al., 2017; De Vogli et al., 2005). The most prominent explanation for these concerning developments is that inequality deteriorates social cohesion leading to a decay of cooperation (Tucker and Xu, 2023). Given the complex interplay of diverse backgrounds and the growing impact of inequality, understanding and fostering cooperation has become increasingly crucial for addressing global challenges.

In addition to an increase in inequality, we can also observe a shift toward societies becoming increasingly individualistic (Santos et al., 2017). While individual cultural differences remain, individualism is one of the most quintessential products of modernity with modern philosophy, politics and the economy all revolving around the individual. This focus on the individual has led to positive accomplishments such as increased entrepreneurship, more cultural diversity or the establishment of various human right movements. However, some fear that an increasingly individualistic society also leads to people becoming selfish, detached from social ties and unwilling to contribute to any form of public good (Hahm, 2000). In fact, a lot of public goods diminished as a result of groups getting more individualistic. Trade unions depreciated as a result of a shift from distinct working classes to a more diverse workforce (Visser, 2019) or more individualistic counties in the US engaged in less social distancing and were more reluctant to vaccines during the COVID-19 pandemic (Bian et al., 2022). The question arises: What happens to an already heterogenous society, if this society also becomes increasingly individualistic? This study tries to answer this question by pursuing the following research question: How do collectivistic and individualistic resource distributions affect cooperation in heterogenous groups and what's the role of group identity?

The influence of heterogeneity and inequality on cooperation has been studied extensively in the past. However, experimental studies examining the impact of unequal resources on cooperation in public goods dilemma do not completely agree. While some studies find that inequality significantly decreases cooperation (Anderson et al., 2008; Heap et al., 2016; Tavoni et al., 2011), other studies report no effect (Chan et al., 1996; Hofmeyr et al., 2007) or show that heterogeneity might even foster cooperation (Hauser et al., 2019). Regarding the effect of individualism on cooperation, previous research has mainly focused on individualistic and collectivistic psychological traits. These studies have shown that individualism can have an influence on cooperation, for example on pro-environmental behavior (Moon et al., 2023) and group tasks (Chen et al., 2007; Wagner, 1995). However, there is not much research, which studies the influence of inequality and individualism on cooperation within an experimental setting.

This study tries to shed light on these mixed results about the effect of inequality on cooperation. It does so by investigating why different studies might show non-converging results by taking a closer look at the definition of heterogeneity and how different forms of inequality have been deployed in previous studies. The study therefore contributes to the existing literature by implementing a new research design which compares collectivistic and individualistic groups to examine the effect of individualism within heterogeneous groups in the public goods game (PGG). Collectivistic groups are defined as heterogeneous groups containing homogenous subgroups (e.g., initial endowments of 150, 150, 50, 50 tokens), while in individualistic groups each group member is unique in terms of their endowment (e.g., initial endowments 160, 120, 80, 40 tokens). This research design allows a clean test of the predictions made by Tyler and Blader (2001), based on the social identity theory (Tajfel and Turner, 2001), which postulates that cooperation is higher the more similar group members are to each other. Furthermore, previous studies have often argued that inequality might affect cooperation through the pathway of group identity. This approach presumes that for high identifiers (high group identity) the group is not only an external entity, but also part of their self-identification (Spears, 2021). This increase in group orientation in turn leads to higher cooperation, when group identity is high. By incorporating both inequality conditions and group identity, this study provides a novel approach to examine the influence of these factors on cooperation within the context of the public goods game (PGG).

The results from an online experiment with 120 participants reveal no significant difference between collectivistic and individualistic groups, which contradicts the social identity theory and puts the results from previous studies in question, which argued that heterogenous groups can only be cooperative, when containing homogenous subgroups (Fung and Au, 2014; Martinangeli and Martinsson, 2020). The study further shows significantly higher cooperation in the two inequality treatments compared to the base version, which resembles an opposite finding to most previous research. Furthermore, the study shows that group identity seems to be an important mediator for the effect of inequality on cooperation, with higher group identity leading to significantly higher cooperation rates. Further analysis revealed that heterogeneous groups showed a great divergence in how successful they were in establishing cooperation. This study identified, that an early ability to reduce the initial inequality is a decisive factor for fostering cooperation, despite the presence of inequality. Groups, able to reduce inequality in the beginning of the game, seem to send a strong signal toward their members, leading to higher group identity. This higher identification with one's group in return leads to people cooperating significantly more often. For groups with high group identity, inequality seems to possess a coordinative function, where it's clear for everybody how much everyone should contribute, leading to an increase in cooperation.

2 Related literature

2.1 Inequality and cooperation

The negative effects of inequality on various economic, social and political areas are well documented. For example, in industrialized countries, economic growth decreases with an increasingly unequal wealth distribution (OECD, 2015) and inequality can even have such severe effects as increasing violence (Pickett and Wilkinson, 2015), undermining democracy (Kuhn et al., 2016) and lowering life-expectancy (Bor et al., 2017; De Vogli et al., 2005). The most prominent explanation for these findings is that inequality reduces social cohesion and the willingness of individuals to cooperate with each other. This results in an insufficient provision of crucial public goods, which is detrimental for a functioning and healthy society (Anderson et al., 2008). Addressing inequality is therefore essential not only for promoting social cohesion but also for ensuring equal contributions toward public goods.

Because of this importance of these effects, social scientists have become very interested in the influence of inequality on cooperation. Two major pathways, the resource-based model and the identity-based model, have been proposed to explain how inequality affects cooperation. The resource-based model postulates that the behavior of the different group members is mainly influenced by the material resources they receive from the group (Fung and Au, 2014). The prediction of the resource-based model for heterogenous groups would be, that inequality affects cooperation simply through differences in payoffs (Aksoy, 2019). Hence, cooperation should decrease under inequality conditions because people tend to be inequity-averse and dislike payoff differences more when it is to their disadvantage (Fehr and Schmidt, 1999).

The main argument of the identity-based model is that the motivation of group members to cooperate is strongly influenced by their identification with the group (Fung and Au, 2014). Inequality can thereby serve as an additional social dimension on which a group identity can be formed (Aksoy, 2019). Therefore, homogeneity between endowments should lead to higher cooperation through the pathway of group identity: "{...}, homogeneity of endowment among group members could accentuate perceived similarity among group members. They are then more likely to self-categorize themselves as in group members. Individuals with high group identity are more group-interest oriented and cooperate more" (Fung and Au, 2014, p. 10). Thus, it can be suggested that group identity mediates the effect of inequality on cooperation by fostering a sense of fairness and collective purpose, particularly when inequality is actively reduced early in the interaction. This strengthened group identity, in turn, encourages group-oriented behavior, leading to higher cooperation rates.

To understand the importance of economic inequality on cooperation better, studies have examined the impact of unequal endowments in public goods games. However, findings of past studies do not completely align. Most studies found that in heterogenous groups, with unequal endowments, cooperation was significantly lower than in homogenous groups, in which each member gets the same endowment (Anderson et al., 2008; Heap et al., 2016; Tavoni et al., 2011). However, some researchers do not find inequality to lower cooperation significantly (Chan et al., 1996; Hofmeyr et al., 2007), while others argue that heterogeneity can even foster cooperation (Hauser et al., 2019). These conflicting results highlight the complexity of the relationship between inequality and cooperation, suggesting that additional factors may influence how unequal endowments affect group dynamics.

2.2 Different forms of heterogeneity

One reason for these non-converging results may be that heterogeneity has not been deployed consistently in previous studies. As a foundation, the inequality of endowments needs to be clearly quantified in order to concretely measure how the degree of inequality impacts cooperation. Inequality within a group can be quantified using the Gini-Coefficient (GC), a measure that ranges from 0 (complete equality) to 1 (complete inequality). The GC reflects the degree to which endowments differ among group members, with higher values indicating greater inequality. This measure can be leveraged to better understand how disparities in resources can impact group dynamics, particularly in the context of cooperation.

Apart from inequality measures, the specific allocation of inequal endowments needs to be considered. An overview of endowment allocations can be seen in Figure 1. Previous studies have implemented different inequality structures, particularly by allocating collectivistic and individualistic resource distributions. For instance, Heap et al. (2016) demonstrated that individualistic resource distributions (e.g., 20, 50, 80 tokens) led to a significant decrease in cooperation, suggesting that greater disparity between individuals can undermine collective efforts. Conversely, Hofmeyr et al. (2007) examined collectivistic groups (e.g., 30, 30, 50, 50 tokens) and found no significant effect of inequality on cooperation, indicating that the presence of homogeneous subgroups might mitigate the negative impacts of inequality. Importantly, these approaches represent symmetric distributions, where unequal endowments were allocated evenly across group members, ensuring that disparities were balanced within the group.

While symmetric approaches ensure balanced disparities within groups, some studies have introduced asymmetry in resource distributions (e.g., 20, 20, 50 tokens) by comparing symmetrically individualistic groups with asymmetrically hegemonic groups, where resources are skewed (Fung and Au, 2014). This introduction of asymmetry complicates the interpretation of results, as it potentially confounds the distinct effects of collectivistic vs. individualistic distributions. Indeed, Paetzel and Traub (2017) have demonstrated that skewness itself can significantly influence cooperation, making it challenging to disentangle the role of group identity from the effects of asymmetric resource allocation. To avoid these confounding factors and provide a clearer understanding of how symmetric inequality conditions affect cooperation, the current study focuses exclusively on symmetric comparisons between collectivistic and individualistic groups, deliberately steering clear of asymmetric approaches.

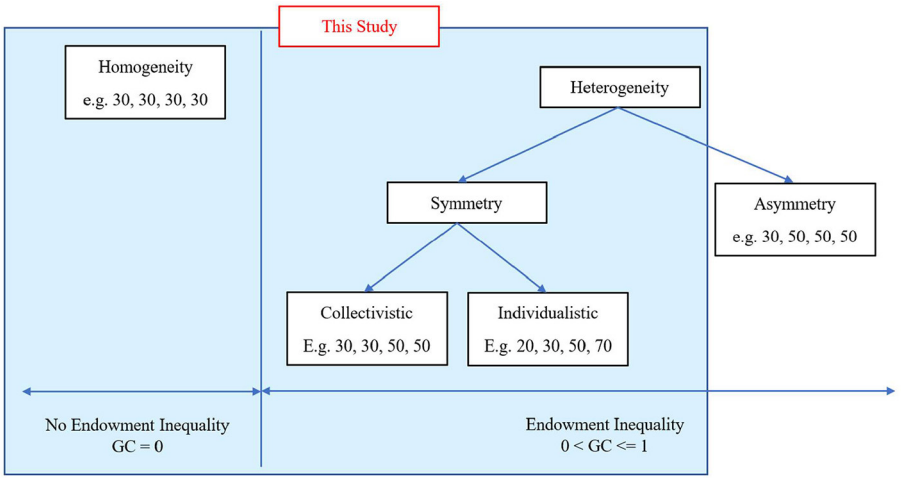

FIGURE 1
Scheme of the different forms of resource distribution.

2.3 Individualism and collectivism

Understanding the fundamental differences between individualism and collectivism is crucial for exploring how these social identities shape behavior in cooperative contexts. Individualism tends to favor the individual over the group, where personal interests are more important than the needs of groups (Wagner, 1995). Individualistic groups are more likely to define themselves as autonomous entities independent of social groups (Chen et al., 2007). Collectivism on the other hand arises when interests of groups are accorded greater importance than the needs of individuals. Collectivistic groups are more concerned with the wellbeing of the group than their personal desires (Marcus and Le, 2013). This difference in we-feeling or social identity between individualistic and collectivistic groups can thereby also influence cooperative behavior in social dilemmas. Individualism tends to amplify the personal identity of a person, which is highlighted by thinking about yourself as a unique individual and strengthens a motivation to maximize individual payoffs. Collectivism reinforces the social identity or group identity, which makes people think about in-group members more in terms of similarities and leads to people focusing more on the outcome for the whole group (Simpson, 2006).

It has already been shown that individualism and collectivism play a crucial role for collective action in natural settings. The study by Moon et al. (2023) showed that people with more collectivistic psychological traits engage significantly more often in pro-environmental behavior (PEB). The reason for this is that their group-oriented goals and norms align better with the collective-oriented public good of a healthy environment. More individualistic people on the other hand show less PEB because they tend to favor independence and their behavior is strongly driven by self-interest. Other papers have shown the same mechanism also for group projects, where collectivistic students contributed significantly more to the assignment than individualistic students did (Chen et al., 2007; Wagner, 1995). These findings highlight the significant impact of social identity on collective action, demonstrating that individualistic and collectivistic traits can influence how people engage in cooperative behaviors and contribute to group efforts.

2.4 Hypotheses

This paper examines whether individualistic and collectivistic motivations are merely psychological traits that influence a person's propensity to cooperate, or whether these motivations can also be shaped by the distribution of resources. Specifically, it investigates whether different resource distributions, either collectivistic or individualistic, can be used to influence participants' decision-making and induce different levels of cooperative behavior. An individualistic distribution means that each member of a group receives a different amount of resources, emphasizing individuality and distinctiveness. Collectivistic distributions, on the other hand, are operationalized as heterogeneous groups containing homogeneous subgroups. This operationalization aligns with Social Identity Theory, which posits that perceived similarity among group members fosters group identity (Hogg, 2003). Homogeneous subgroups within heterogenous groups provide pockets of similarity, reinforcing shared identity and collective behavior. This reflects the principles of collectivism, where a shared group identity fosters prioritization of group outcomes and mutual goals over individual gain.

Social Identity Theory predicts that different resource distributions affect cooperation by influencing how much individuals identify with their group. Perceived similarity makes people more likely to categorize themselves as group members, increasing group-oriented behavior and cooperation. It follows that cooperation should be particularly high in homogeneous groups, where every member receives the same resources.

Hypothesis 1: Cooperation is lower in both inequality treatments (individualistic and collectivistic) compared to the baseline treatment with no inequality.

However, group identity and cooperation rates might also differ between different forms of heterogeneity. In collectivistic groups, group identity might be less likely to decline because each person always has another group member with an equal amount of resources (Fung and Au, 2014). Homogeneous subgroups might lead to relatively high levels of group identity and stable levels of cooperation, despite high levels of inequality at the group level. Members of individualistic groups, on the other hand, are more likely to maintain a strong personal identity because there is greater differentiation between each group member. Hence the second hypothesis:

Hypothesis 2: Cooperation is lower in the individualistic treatment compared to the collectivistic treatment.

The second aim of this study is to further explore how heterogeneity affects cooperation rates in public goods dilemmas. While previous research has suggested that differences in cooperation between homogeneous and heterogeneous groups may be due to different levels of group identification (Aksoy, 2019; Fung and Au, 2014; Martinangeli and Martinsson, 2020), this assumption has not been directly tested. These studies often rely on social identity theory to explain their findings, but fall short by not explicitly measuring group identification. Given that higher group identification has already been shown to significantly enhance cooperation in homogeneous groups (Simpson, 2006), it is crucial to investigate whether this relationship also holds in heterogeneous groups. This study examines the interplay between inequality and group identity and how they together affect cooperative behavior.

Hypothesis 3: Group Identity mediates the effect of inequality on cooperation.

3 Methods

3.1 The public goods game

There were three types of groups examined in this study: (1) the baseline of homogeneous groups with equal endowments, (2) collectivistic groups with two high endowment players and two low endowment players, and (3) individualistic groups with a symmetrical distribution of very high, high, low and very low endowments. Participants played a repeated linear public goods game in groups of four players, which lasted for 10 rounds. In each round, players were able to allocate their endowment (Tokens) between a private account and a group account. Tokens kept back by the players directly converted into their profit. Each contribution made to the group account was doubled and equally shared among all the group members (MPCR = 0.5). After each contribution round, players were able to see all the contributions and profits of the other group members. However, anonymity was guaranteed throughout the experiment.

3.2 Treatment

Each treatment was given a specific allocation of tokens according to the corresponding inequality measure (see Table 1).

TABLE 1 Endowment distributions by treatment.

	Player 1	Player 2	Player 3	Player 4
Baseline (homogenous)	100	100	100	100
Individualistic	160	120	80	40
Collectivistic	150	150	50	50

In the homogeneous baseline groups, each of the four players received 100 tokens. In the collectivistic group treatment, two players received a high endowment of 150 tokens, while two players received a low endowment of 50 tokens. In the individualistic groups, each player received a different amount of either 160, 120, 80, or 40 tokens. Endowments were randomly assigned, as research has shown that contributions are unaffected by whether endowments are earned or randomly assigned (Cherry et al., 2005), and random assignment also eliminates potential sorting effects. The specific number of tokens was chosen to make the collectivistic and individualistic groups as similar as possible. For example, the collectivistic and individualistic groups do not differ in the degree of inequality, as both groups have a Gini coefficient[1] of 0.25 (see Appendix 1 for the calculation). In addition, the distribution of tokens in the collectivistic and individualistic groups is symmetrical. This means that there is no skew toward either high or low endowments, as in previous studies (Fung and Au, 2014; Martinangeli and Martinsson, 2020). The only difference between the two treatments is that in collectivistic groups there are two subgroups, each with the same number of tokens, whereas in individualistic groups each group member receives a different endowment. The mean endowments are the same for all treatments and the Nash equilibrium is zero contribution for all groups.

3.3 Measures

The questions for measuring group identity are based on the group-identity scale (GIS) by Hinkle et al. (1989) and slightly modified to capture five distinct categories: self-categorization, evaluation, importance, attachment and behavioral involvement (see Appendix 2). The resulting group identity index captures the most important dimensions for a valid measurement of identity according to Heere and James (2007) and has already been shown to correlate positively with cooperation (Chen et al., 2007). One additional question asked whether participants felt a stronger connection to some group members compared to others to check for potential differences between collectivistic and individualistic groups. Finally, participants had to state how (un)equal they perceived the resource distributions in the two inequality treatments to make sure both treatments triggered the same level of perceived inequality.

1 The Gini coefficient was calculated with the formula $G = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}|x_i - x_j|}{2n\sum_{i=1}^{n}x_i}$, where x_i is the endowment of person i and n is the number of participants.

TABLE 2 Descriptive distributions of experiment sample.

Category group	Category	Count	Percentage
Age group	Mean	120	X
Employment grouped	In paid work	52	43.30%
	Not in paid work	45	37.50%
	NA	23	19.20%
Ethnicity grouped	White	90	75.00%
	Black	18	15.00%
	Other	10	8.30%
	NA	2	1.7%
Language grouped	Non-English	97	80.80%
	English	20	16.70%
	NA	3	2.50%
Sex	Male	61	50.80%
	Female	57	47.50%
	NA	2	1.70%
Top 5 country of origin	Portugal	26	21.70%
	Poland	25	20.80%
	South Africa	18	15.00%
	Italy	12	10.00%
	Mexico	7	5.80%

3.4 Recruitment and experiment

The experiment was programmed in Python and deployed using the Otree framework (Chen et al., 2016). Participants were recruited from Prolific, a platform commonly used to recruit participants for research purposes. Studies have shown that Prolific provides higher data quality compared to other online samples, such as MTurk (Peer et al., 2022). In addition, online samples do not show lower diversity and data quality than traditional laboratory experiments, which tend to recruit students from universities (Douglas et al., 2023). However, it's important to note that the present online sample may not be representative when making population-level inferences about the whole population (see also descriptive statistics). Participants received a fixed enrolment fee (£2) if they completed the full study. They also received a bonus payment based on their performance in the public goods game, with 500 tokens converted to £1. On average, participants received £2.86 in bonus payments and took 12 min and 31 s to complete the study, resulting in an average hourly wage of £23.33.

4 Results

4.1 Descriptive results

A total of 120 people took part in the experiment. Sociodemographic information about the participants was obtained from their personal profile on Prolific. This has the advantage that users on Prolific have to verify their age and gender with official identification. Categorical variables were grouped and expired data were coded as missing. Table 2 provides an overview of the socio-demographic characteristics of this sample. Regarding age, it's important to note that the subjects in our sample are relatively young, with an average age of 26.8 years and the oldest participant being 54 years old. In terms of gender, slightly more participants identified as male 50.8% ($n = 61$) than female 47.5% ($n = 57$) and two people did not indicate their gender. In terms of other socio-demographic characteristics, the sample includes participants who are predominantly white 75% ($n = 90$) and non-native English speakers 80.8% ($n = 97$). Slightly more participants are in paid employment 43.3% ($n = 52$) than are not currently in paid employment 37.5% ($n = 45$), while 23 people didn't specify their employment status. The sample is geographically diverse, with people from different countries and a total of 25 nationalities represented in the sample. Portugal had the most participants with 21.7% ($n = 26$), followed by Poland with 20.8% ($n = 25$), South Africa with 15% ($n = 18$), Italy with 10% ($n = 12$) and Mexico with 5.8% ($n = 7$). These countries represented the majority of participants and together accounted for 73.3% of the total sample.

4.2 Decision analysis

Figure 2 shows the mean cooperation rates for homogeneous, collectivistic and individualistic groups over the 10 rounds of the public goods game, with 1 indicating a contribution of the entire endowment and 0 representing no contribution at all to the public good. The line plot shows that groups in all treatments start out with a cooperation rate of ~35%. Afterwards cooperation increases up until round 5 or 6, although this increase is more pronounced for the individualistic and collectivistic groups compared to the base version. In the following, the cooperation rate drops constantly in the base version and reaches a low point by the end of round 10 (26.8%). In contrast, the cooperation rate remains relatively stable in the two treatments with inequality.

Figure 3 shows the average cooperation rates across all three treatments. The mean cooperation rate over 10 rounds for the baseline treatment is 35.7%, with a minimum contribution of 0% and no one contributing more than 80% of their total endowment. Collectivistic (mean 51.3%, SD 27.7%) and individualistic (mean 51.5%, SD 26.8%) treatments show substantially higher contributions on average than the baseline treatment (mean 35.7%, SD 21.8%). Welch's t-tests[2] confirm this difference, with the collectivistic treatment showing a statistically significant increase in contributions compared to the base version ($t = 2.795$, $p = 0.0033$), and the individualistic treatment also showing a significant increase ($t = 2.895$, $p = 0.0025$, 95%). The high standard deviations suggest that the groups differed considerably in how successfully they established cooperation. This is especially

2 Note that p-values throughout this analysis were not corrected for multiple comparisons because the t-tests were limited to a small, pre-specified set of comparisons directly tied to the study's hypotheses, minimizing the risk of Type I errors.

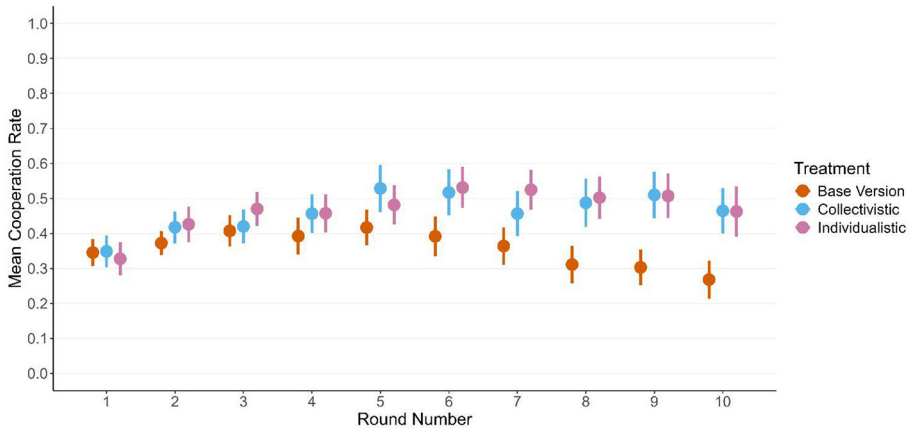

FIGURE 2
Line plot of average contribution rates by treatment.

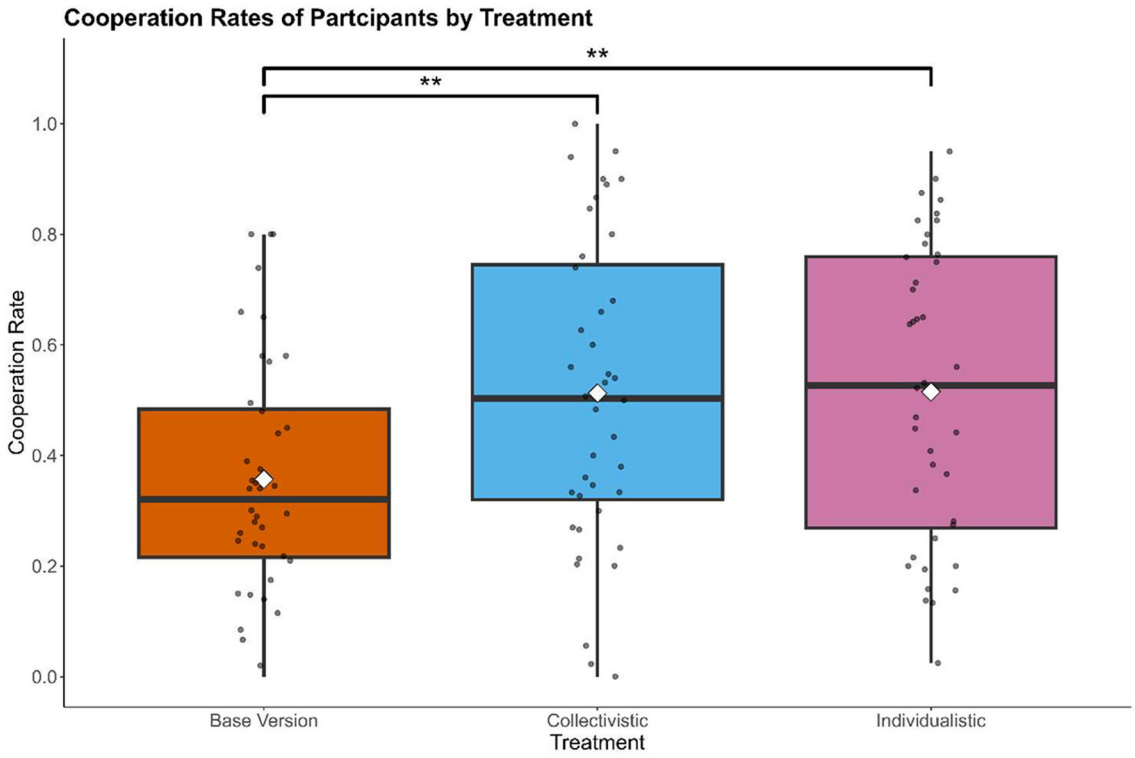

FIGURE 3
Boxplot of mean cooperation rate by treatment. $^{**}p < 0.05$, indicates statistically significant differences.

true in the two inequality treatments, where some participants did not contribute at all, while others contributed almost their entire endowment.

A linear regression analysis was performed to check whether the differences in cooperation between treatments are indeed statistically significant (see Table 3). The dependent variable is the mean cooperation rate over all 10 rounds of the public goods game. For the regression analysis, three individuals were excluded due to expired information on their socio-demographic characteristics, and one additional individual was excluded for not answering group identity items.

The gross model of the linear regression shows the difference in cooperation rates between participants in the different treatments. Compared to the baseline, cooperation is about 16 percentage points higher in the collectivistic treatment and even 18 percentage points higher for participants in individualistic groups, which can be described as a substantial difference. The regression analysis confirms the suggestion from the visual inspection of the box

10.3389/frbhe.2025.1494271

TABLE 3 Linear regression analysis of mean cooperation rate.

	Dependent variable: mean cooperation rate		
	Gross model	Net model	Mediation model
Treatment: collectivistic (ref: base treatment)	0.16*** (0.06)	0.16*** (0.06)	0.12** (0.05)
Treatment: individualistic (ref: base treatment)	0.18*** (0.06)	0.18*** (0.06)	0.13** (0.05)
Group identity			0.01*** (0.003)
Age		−0.0001 (0.004)	0.001 (0.003)
Male (ref. female)		−0.08 (0.05)	−0.09* (0.05)
Ethnicity: other (ref: Black)		0.08 (0.09)	0.03 (0.08)
Ethnicity: White (ref: Black)		0.04 (0.11)	−0.08 (0.11)
Language Non-English (ref: English)		0.01 (0.11)	0.07 (0.10)
Constant	0.36*** (0.04)	0.39*** (0.12)	0.03 (0.13)
Observations	116	116	116
R^2	0.09	0.13	0.28

*p < 0.1; **p < 0.05; ***p < 0.01.

TABLE 4 Linear regression analysis of mean cooperation rate in inequality treatments.

	Dependent variable: mean cooperation rate		
	Net model	Mediation model	Interaction model
Treatment: individualistic (ref. collectivistic)	0.02 (0.05)	0.01 (0.04)	0.01 (0.04)
Gini coefficient (after round 1)	−3.57*** (0.62)	−2.81*** (0.60)	−3.52* (2.09)
Group identity		0.01*** (0.003)	0.01 (0.01)
Final payout	−0.15*** (0.03)	−0.16*** (0.03)	−0.16*** (0.03)
Age	0.003 (0.004)	0.004 (0.004)	0.003 (0.004)
Male (ref. female)	0.13** (0.05)	0.12** (0.04)	0.12** (0.04)
Ethnicity: White (ref. Black)	0.01 (0.15)	0.12 (0.14)	0.11 (0.14)
Ethnicity: other (ref. Black)	0.09 (0.17)	0.15 (0.15)	0.15 (0.16)
Language: Non-English (ref. English)	−0.13 (0.15)	−0.17 (0.14)	−0.16 (0.14)
Gini coefficient * group identity			0.03 (0.08)
Constant	1.51*** (0.19)	0.99*** (0.22)	1.12*** (0.41)
Observations	77	77	77
R^2	0.46	0.56	0.56

*p < 0.1; **p < 0.05; ***p < 0.01.

plot that these differences in cooperation are also statistically highly significant ($p < 0.01$). The net model includes the socio-demographic variables of age, gender, ethnicity and language as control variables. However, this has no effect on the coefficients for the treatment variable and none of the control variables has a significant effect on cooperation rates. This result does not support the first hypothesis that cooperation is lower in the two inequality treatments than in the baseline. In fact, the results show the opposite, that inequality leads to an increase in cooperation. This is surprising because the level of inequality was chosen to be relatively high (GC = 0.25) and the inequalities were perceived as very unequal (see Appendix 3). Furthermore, other studies using the same level of inequality have found a significant negative effect of inequality on cooperation (Cherry et al., 2005; Heap et al., 2016).

Responses to the post-experiment survey indicated that there was no significant difference in perceived inequality between the collectivistic and individualistic group treatments, as confirmed by a Welch's t-test[3] ($t = -0.927$, $p = 0.3547$). This means that the two treatments, which have the same level of inequality (GC = 0.25), are also perceived as having a similar level of inequality. Nevertheless, the second hypothesis stated that cooperation would be lower in individualistic groups than in collectivistic groups. However, the results did not support this hypothesis. A t-test confirms that there is no statistically significant difference between collectivistic and individualistic groups in terms of cooperation ($t = -0.043$, $p = 0.9659$). The results also show only a marginal difference in group identity between the two inequality treatments ($t = 0.641$, $p = 0.5235$). In addition, participants in collectivistic groups were no more likely than participants in individualistic groups to agree that they felt more connected to some group members than to others. This further supports the finding that the different distribution of resources in the two inequality treatments did not affect either group identity or cooperation.

Finally, the mediation model examines whether group identity mediates the effect of inequality on cooperation, as stated in Hypothesis 3. The results in Table 4 show that an increase in group identity leads to a significant increase in cooperation. An additional point on the 45-point Likert scale increases cooperation by 1 percentage point on average. The effect remains significant even after controlling for the participants' final payout (see Table 4). At the same time, the coefficients on the treatment variable are actually lower in the mediation model than in the net model, suggesting that group identity at least partly mediates the treatment effect on cooperation. This finding supports Hypothesis 3, but not in the direction that was anticipated before the study was conducted. The assumption was that group identity would be lower in unequal groups and mediate the negative effect of inequality on cooperation. Now the opposite seems to be true. Group identity is higher in

3 As in the previous analysis, *p*-values were not adjusted for multiple comparisons because the *t*-tests were conducted on a small, pre-specified set of comparisons directly aligned with the study's hypotheses, thereby minimizing the risk of Type I errors.

unequal groups and seems to mediate the increase in cooperation under inequality conditions.

4.3 Further decision analysis

As mentioned above, the results of the study could be described as counterintuitive, as they are not in line with most previous studies, most of which show a negative effect of inequality on cooperation. However, the results presented in this study are still highly significant and therefore require further investigation. Looking at the different groups under inequality conditions, it's clear that not all groups were more successful in cooperating than perfectly equal groups in the baseline version. Instead, there is a large divergence between groups that were very successful in establishing cooperation and groups where members did not cooperate at all (see also Appendix 4). This is also indicated by the larger standard deviation for collectivistic (SD = 0.277) and individualistic (SD = 0.268) groups compared to groups in the baseline version (SD = 0.218). The question arises: What makes a successful group even under conditions of inequality?

4.3.1 Inequality measures

When comparing the different groups in the two inequality treatments, it's striking that the groups are very different in how successful they are in reducing the initial inequality. All groups in the collectivistic and individualistic treatments start round 1 with the same level of inequality (GC = 0.25). However, some groups are able to halve inequality by the end of the first round, while other groups actually increase inequality. A rapid reduction in inequality could therefore act as a strong signal of group cohesion and encourage cooperation. Figure 4 shows the mean cooperation rates for groups above (GC > 0.165) and below (GC < 0.165) the median inequality after round 1 for the remaining nine rounds. Groups that were able to reduce their inequality below the median already show significantly higher cooperation rates in round 2, and cooperation tends to increase slightly in subsequent rounds. Groups those were not able to reduce inequality in round 1 show lower cooperation rates in round 2 and then cooperation remains relatively stable at a low level. Inequality reducing groups seem to be able to achieve very high and stable cooperation rates. Groups that are not able to reduce inequality tend to follow the trajectory of groups in the baseline version and show very similar cooperation rates. The ability to reduce inequality in the beginning seems to strongly benefit cooperation in subsequent rounds. This mechanism works in the same way for both collectivistic and individualistic groups.

4.3.2 Group identity

A similar pattern emerges when looking at the two inequality treatments through the lens of group identity. The median for the group identity variable was 26 on the 45-point Likert scale for collectivistic and individualistic groups. Participants were categorized as having either high (>26) or low (≤26) group identity. Figure 5 shows that there is little difference in cooperation for Round 1 between the different treatments and group identity categories. Instead, individuals with high group identity tend to increase their cooperation over time, with the largest jump in cooperation occurring from the first to the second round. Individuals with low group identity again follow the trajectory of participants in the baseline version, with cooperation rates remaining at a low level. Although everyone starts with a very similar level of cooperation in round 1, the level of cooperation evolves very differently in subsequent rounds, depending on one's identification with the group.

4.3.3 The mediating effect of group identity

A comparison of Figures 4, 5 shows that both graphs follow a very similar trajectory. Although it could be concluded that inequality reduction and group identity are related, the interaction did not prove significant in the linear regression (see Table 4). Nevertheless, the ability to reduce inequality at the beginning of the game could play an important role in establishing cooperation. The willingness to quickly address inequality thus becomes a unifying force that shapes the shared identity of the group, which in turn promotes cooperation in subsequent interactions. Indeed, members of groups that were able to reduce inequality below the median showed higher identification with their group than members of groups that were unable to do so (31 vs. 26 points on the identification scale). This finding supports the idea that early inequality reduction fosters a shared sense of fairness and collective purpose, enhancing group identity. The mediation analysis further supports this relationship (see Table 4). The inclusion of group identity in the mediation model reduced the coefficient for inequality (Gini coefficient after Round 1) from −3.57 in the net model to −2.81, indicating partial mediation. This suggests that group identity helps explain part of the effect of inequality on cooperation by encouraging group-oriented behavior. Participants with high group identity demonstrated a notable increase in cooperation over time, particularly between the first and second rounds, whereas participants with low group identity maintained low cooperation levels throughout the game. These findings underscore the importance of group identity as a mechanism that can transform early inequality reduction into sustained cooperative behavior.

4.3.4 Endowment inequalities

An interesting question is what drives the higher cooperation rates in the inequality treatments. In particular, do players with high endowments lead by example and contribute more, signaling a cooperative strategy as suggested by Güth et al. (2007) Initial contributions in round 1 suggest that players with higher endowments did indeed contribute more (see Appendix 5). In subsequent rounds, slightly advantaged and slightly disadvantaged participants increased their contributions to match those of higher endowed participants, while disadvantaged and very disadvantaged participants maintained lower contributions throughout the experiment (see Appendix 6). These patterns reveal three distinct groups: those with high, more neutral and low initial endowments. A linear mixed effects model shows that participants in the disadvantaged group contributed substantially less than those

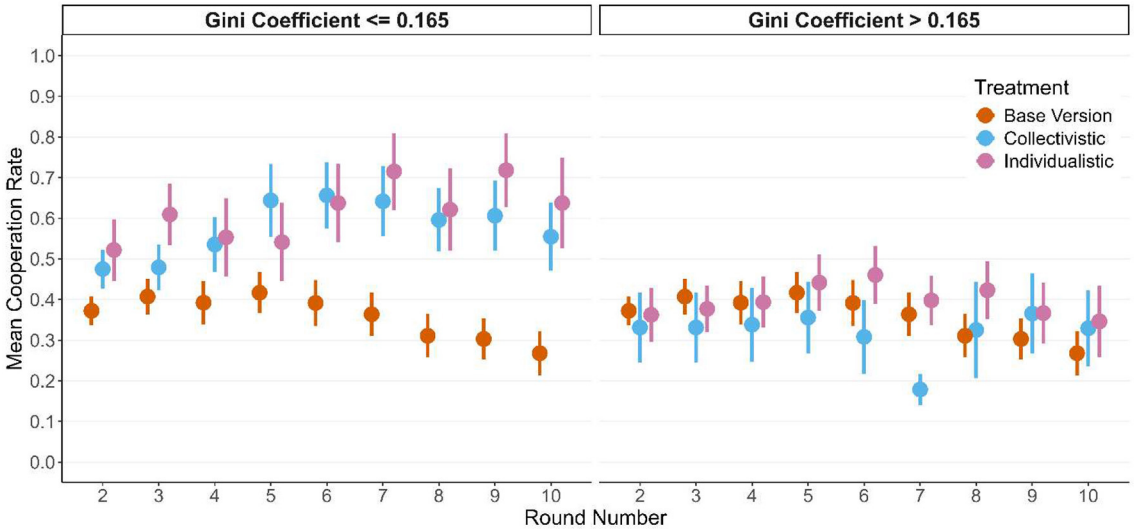

FIGURE 4
Plot of average contribution rates by treatment and inequality reduction.

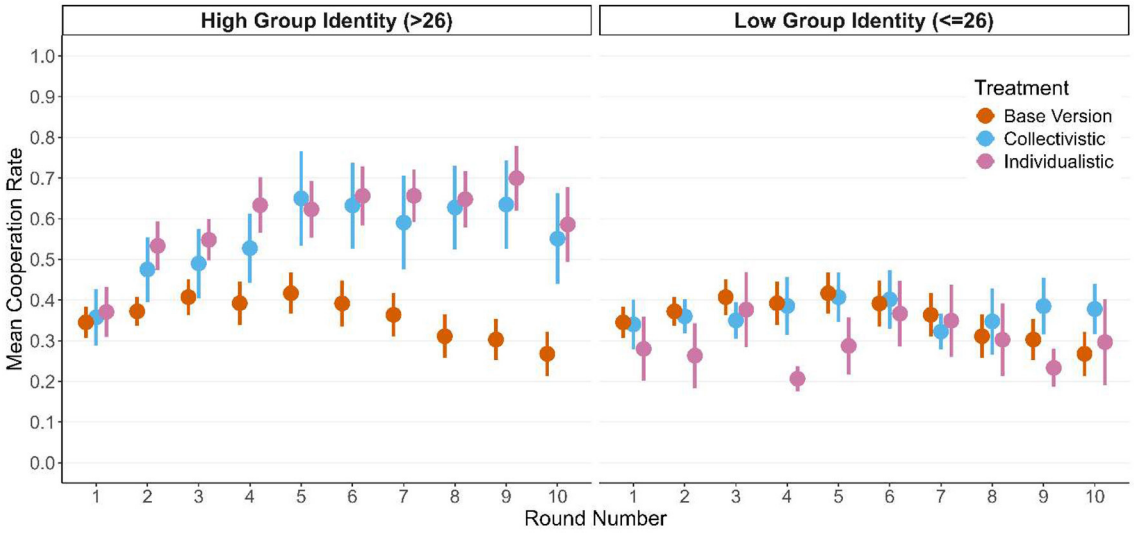

FIGURE 5
Plot of average contribution rates by treatment and group identity.

in the very advantaged group ($\beta = -18.01$, $p \approx 0.13$), and those in the very disadvantaged group contributed even less ($\beta = -24.05$, $p \approx 0.08$) (see Appendix 7). These results suggest that economic inequality affects cooperative behavior, with less advantaged individuals contributing less initially and over time. However, the higher contributions of advantaged participants effectively offset the lower contributions of disadvantaged groups, leading to higher overall mean cooperation rates in the inequality treatments compared to the baseline. Interestingly, while advantaged contributors can encourage slightly advantaged and disadvantaged participants to increase their contributions, they are less effective in increasing the contributions of the most disadvantaged.

5 Discussion

The aim of this study was to contribute to a better understanding of how inequality affects cooperation and to shed light on the somewhat mixed results of previous studies. The study showed that heterogeneity has not been used consistently in previous research and provided a categorization scheme to distinguish these different forms of inequality. Two new categories, "collectivistic groups" and "individualistic groups", were proposed to examine the combined effect of individualism and inequality on cooperation. This research design allowed a clear test of the prediction of social identity theory that cooperation is higher when group members are more similar to each other. The results

showed that there was no significant difference in cooperation between collectivistic and individualistic groups. This finding contradicts the social identity theory and the conclusions of Fung and Au (2014) and Martinangeli and Martinsson (2020), that heterogeneous groups can only be cooperative when they contain homogeneous subgroups. Furthermore, cooperation was significantly higher in collectivistic and individualistic groups compared to the baseline with no inequality. This is a surprising result, and is in contrast to most previous research. However, the groups in the two inequality treatments differed greatly in how successful they were at establishing cooperation. Further decision analysis revealed that the ability to reduce the initial inequality at the beginning of the game was a strong predictor of higher group identity and higher cooperation rates. For groups with high group identity, inequality seems to have a coordinative function, where it's clear to everyone how much everyone should contribute, leading to an increase in cooperation.

This study is not without its limitations. Firstly, we only looked at one specific level of inequality (GC=0.25). It can be argued that the mechanisms described in this study may vary depending on the level of inequality. Therefore, future studies should also examine other resource distributions and levels of inequality, similar to Fung and Au (2014), to confirm or reject the findings presented here. Second, this study represents a single-group paradigm, which is an oversimplification of reality. Individuals may only develop a strong group identity when comparing their in-group with other out-groups. Social identity theory suggests that in-group cooperation may increase when competing with other groups (Chen and Li, 2009). Therefore, in a multi-group setting, cooperation with the in-group might increase, while group negative attitudes toward members of other groups might develop (Guala and Filippin, 2017). Therefore, a more complex social structure with multiple different groups, as conducted by Martinangeli and Martinsson (2020), might be fruitful for future research. Third, inequality was introduced exogenously by randomly varying the endowments of the different agents. The positive effects of inequality on cooperation may be diminished if higher endowments are earned rather than randomly allocated. Although the study by Cherry et al. (2005) showed that cooperation in the PGG is not affected by whether endowments are earned or not, it's reasonable to assume that the effects of inequality are different in a real-world setting, where income is usually earned through work or some other form of merit. Finally, the survey questions were answered after playing the public goods game. Therefore, group identity scores could be biased depending on how successfully one's own group cooperated during the game. This limitation was accounted for by controlling for participants' final payouts, and the results indicated that higher group identity still leads to higher cooperation and partially mediates the effect of inequality on cooperation. However, future studies investigating the role of group identity on cooperation should include both ex-ante and ex-post measures of group identity.

Despite certain limitations, the results of this study provide valuable insights into how inequality can affect cooperation within heterogeneous groups. Contrary to the common belief that inequality and individualism inherently reduce social cohesion and cooperation, the Public Goods Game (PGG) results revealed no significant difference in cooperation between collectivistic and individualistic groups. In fact, cooperation was significantly higher in these inequality treatments than in the baseline, challenging previous research and the predictions of social identity theory, which suggests that similarity among group members promotes cooperation. Further analysis revealed that an early ability to reduce initial inequality strongly predicted higher group identity and cooperation rates. These findings suggest that inequality doesn't necessarily have a negative effect on cooperation; rather, especially in groups with strong group identity, it can serve a coordinative function, counteracting the diffusion of responsibility and even enhancing cooperative behavior. Although these findings are exploratory, they provide a promising basis for future research on how to achieve high levels of cooperation in the face of inequality and argue for policies that promote redistribution. For example, industrialized countries could set an example by taking greater responsibility in global cooperative efforts, such as combating climate change. By committing to a fairer distribution of resources and supporting less affluent countries through financial aid and technology transfer, these states could strengthen global group identity and foster a spirit of collective action. These implications could potentially lead to a reassessment of how resources are distributed, with the aim of promoting greater cooperation and social cohesion at both local and global levels.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical approval was not required for the studies involving humans because at the federal level, only studies in biology, medicine, and psychology necessitate ethical approval. At the local university level, behavioral economic experiments do not require ethical clearance unless they involve critical elements, such as deception. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

SS: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. NM: Formal analysis, Project administration, Visualization, Writing – review & editing. VO: Data curation, Writing – review & editing. HR: Funding acquisition, Supervision, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article.

This work was supported by Grant BSSGI0_155981 and Grant 10001A_176333/1 from the Swiss National Science Foundation.

Acknowledgments

GPT4o from OpenAI has been used to improve the writing and grammar of this article.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/frbhe.2025.1494271/full#supplementary-material

References

Aksoy, O. (2019). Crosscutting circles in a social dilemma: effects of social identity and inequality on cooperation. *Soc. Sci. Res.* 82, 148–163. doi: 10.1016/j.ssresearch.2019.04.009

Anderson, L. R., Mellor, J. M., and Milyo, J. (2008). Inequality and public good provision: an experimental analysis. *J. Socio Econ.* 37, 1010–1028. doi: 10.1016/j.socec.2006.12.073

Bian, B., Li, J., Xu, T., and Foutz, N. Z. (2022). Individualism during crises. *Rev. Econ. Stat.* 104, 368–385. doi: 10.1162/rest_a_01107

Bor, J., Cohen, G. H., and Galea, S. (2017). Population health in an era of rising income inequality: USA, 1980-2015. *Lancet* 389, 1475–1490. doi: 10.1016/S0140-6736(17)30571-8

Chan, K. S., Mestelman, S., Moir, R., and Muller, R. A. (1996). The voluntary provision of public goods under varying income distributions. *Can. J. Econ.* 29, 54–69. doi: 10.2307/136151

Chen, D. L., Schonger, M., and Wickens, C. (2016). oTree—an open-source platform for laboratory, online, and field experiments. *J. Behav. Exp. Finan.* 9, 88–97. doi: 10.1016/j.jbef.2015.12.001

Chen, X.-P., Arzu Wasti, S., and Triandis, H. C. (2007). When does group norm or group identity predict cooperation in a public goods dilemma? The moderating effects of idiocentrism and allocentrism. *Int. J. Intercult. Relat.* 31, 259–276. doi: 10.1016/j.ijintrel.2006.02.004

Chen, Y., and Li, S. X. (2009). Group identity and social preferences. *Am. Econ. Rev.* 99, 431–457. doi: 10.1257/aer.99.1.431

Cherry, T. L., Kroll, S., and Shogren, J. F. (2005). The impact of endowment heterogeneity and origin on public good contributions: Evidence from the lab. *J. Econ. Behav. Organ.* 57, 357–365. doi: 10.1016/j.jebo.2003.11.010

De Vogli, R., Mistry, R., Gnesotto, R., and Cornia, G. A. (2005). Has the relation between income inequality and life expectancy disappeared? Evidence from Italy and top industrialised countries. *J. Epidemiol. Community Health* 59, 158–162. doi: 10.1136/jech.2004.020651

Douglas, B. D., Ewell, P. J., and Brauer, M. (2023). Data quality in online human-subjects research: comparisons between MTurk, Prolific, CloudResearch, Qualtrics, and SONA. *PLoS ONE* 18:e0279720. doi: 10.1371/journal.pone.0279720

Fehr, E., and Schmidt, K. (1999). A theory of fairness, competition, and cooperation. *Q. J. Econ.* 114, 817–868. doi: 10.1162/003355399556151

Fung, J. M. Y., and Au, W. (2014). Effect of inequality on cooperation: heterogeneity and hegemony in public goods dilemma. *Organ. Behav. Hum. Decis. Process.* 123, 9–22. doi: 10.1016/j.obhdp.2013.10.010

Guala, F., and Filippin, A. (2017). The effect of group identity on distributive choice: social preference or heuristic? *Econ. J.* 127, 1047–1068. doi: 10.1111/ecoj.12311

Güth, W., Levati, M. V., Sutter, M., and van der Heijden, E. (2007). Leading by example with and without exclusion power in voluntary contribution experiments. *J. Public Econ.* 91, 1023–1042. doi: 10.1016/j.jpubeco.2006.10.007

Hahm, C. (2000). The cultural challenge to individualism. *J. Democ.* 11, 127–134. doi: 10.1353/jod.2000.0012

Hauser, O. P., Hilbe, C., Chatterjee, K., and Nowak, M. A. (2019). Social dilemmas among unequals. *Nature* 572, 524–527. doi: 10.1038/s41586-019-1488-5

Heap, S. P. H., Ramalingam, A., and Stoddard, B. V. (2016). Endowment inequality in public goods games: a re-examination. *Econ. Lett.* 146, 4–7. doi: 10.1016/j.econlet.2016.07.015

Heere, B., and James, J. D. (2007). Stepping outside the lines: developing a multi-dimensional team identity scale based on social identity theory. *Sport Managem. Rev.* 10, 65–91. doi: 10.1016/S1441-3523(07)70004-9

Hinkle, S., Taylor, L. A., Fox-Cardamone, D. L., and Crook, K. F. (1989). Intragroup identification and intergroup differentiation: a multicomponent approach. *Br. J. Soc. Psychol.* 28, 305–317. doi: 10.1111/j.2044-8309.1989.tb00874.x

Hofmeyr, A., Burns, J., and Visser, M. (2007). Income inequality, reciprocity and public good provision: an experimental analysis. *South Afric. J. Econ.* 75, 508–520. doi: 10.1111/j.1813-6982.2007.00127.x

Hogg, M. A. (2003). "Social identity," in *Handbook of Self and Identity*, eds. R. Leary, and J. P. Tangney (New York, NY: The Guilford Press).

Kuhn, T., van Elsas, E., Hakhverdian, A., and van der Brug, W. (2016). An ever wider gap in an ever closer union: rising inequalities and euroscepticism in 12 West European democracies, 1975–2009. *Socio-Econ. Rev.* 14, 27–45. doi: 10.1093/ser/mwu034

Marcus, J., and Le, H. (2013). Interactive effects of levels of individualism–collectivism on cooperation: a meta-analysis. *J. Organ. Behav.* 34, 813–834. doi: 10.1002/job.1875

Martinangeli, A. F. M., and Martinsson, P. (2020). We, the rich: Inequality, identity and cooperation. *J. Econ. Behav. Organ.* 178, 249–266. doi: 10.1016/j.jebo.2020.07.013

Moon, K.-K., Lee, S.-H., and Jeong, S.-Y. (2023). Examining the relationship between individualism and pro-environmental behavior: the moderating role of social cohesion. *Behav. Sci.* 13:8. doi: 10.3390/bs13080661

OECD (2015). *In It Together: Why Less Inequality Benefits All*. Paris: OECD. Available at: https://www.oecd.org/en/publications/2015/05/in-it-together-why-less-inequality-benefits-all_g1g554a1.html (accessed September 9, 2024).

Paetzel, F., and Traub, S. (2017). Skewness-adjusted social preferences: experimental evidence on the relation between inequality, elite behavior, and economic efficiency. *J. Behav. Exp. Econ.* 68, 130–139. doi: 10.1016/j.socec.2017.05.001

Peer, E., Rothschild, D., Gordon, A., Evernden, Z., and Damer, E. (2022). Data quality of platforms and panels for online behavioral research. *Behav. Res. Methods* 54, 1643–1662. doi: 10.3758/s13428-021-01694-3

Pickett, K. E., and Wilkinson, R. G. (2015). Income inequality and health: a causal review. *Soc. Sci. Med.* 128, 316–326. doi: 10.1016/j.socscimed.2014.12.031

Santos, H. C., Varnum, M. E. W., and Grossmann, I. (2017). Global Increases in individualism. *Psychol. Sci.* 28, 1228–1239. doi: 10.1177/0956797617700622

Simpson, B. (2006). Social identity and cooperation in social dilemmas. *Ration. Soc.* 18, 443–470. doi: 10.1177/1043463106066381

Spears, R. (2021). Social influence and group identity. *Ann. Rev. Psychol.* 72, 367–390. doi: 10.1146/annurev-psych-070620-111818

Tajfel, H., and Turner, J. (2001). "An integrative theory of intergroup conflict," in *Intergroup Relations: Essential Readings* (East Sussex: Psychology Press), 94–109.

Tavoni, A., Dannenberg, A., Kallis, G., and Löschel, A. (2011). Inequality, communication, and the avoidance of disastrous climate change in a public goods game. *Proc. Nat. Acad. Sci.* 108, 11825–11829. doi: 10.1073/pnas.1102493108

Tucker, S., and Xu, Y. (2023). Fairness, (perception of) inequality, and redistribution preferences. *J. Econ. Surv.* 37, 1529–1533. doi: 10.1111/joes.12582

Tyler, T. R., and Blader, S. L. (2001). Identity and cooperative behavior in groups. *Group Proc. Intergroup Relat.* 4, 207–226. doi: 10.1177/1368430201004003003

Visser (2019). *Trade Unions in the Balance | International Labour Organization*. Geneva: International Labour Organization. Available at: https://www.ilo.org/publications/trade-unions-balance (accessed September 9, 2024).

Wagner, J. A. (1995). Studies of individualism-collectivism: effects on cooperation in groups. *Acad. Managem. J.* 38, 152–172. doi: 10.2307/256731

Xu, Y., and Marandola, G. (2023). The (negative) effects of inequality on Social Capital. *J. Econ. Surv.* 37, 1562–1588. doi: 10.1111/joes.12558