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# Support for redistribution is shaped by motives of egalitarian division and coercive redistribution

Chien-An Lin, Timothy C. Bates\*

Department Psychology, University of Edinburgh, 7 George Square, Edinburgh EH8 9JZ, United Kingdom

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## ABSTRACT

The three-player evolutionary model of support for redistribution is compatible with a fairness motive; however, existing research has found near-zero effects of fairness. Here we propose an egalitarian division fairness motive, solving the problem of reward for collaboration and impacting support for redistribution. Study 1 ( $N = 403$ ) showed egalitarian division fairness had additional predictive power predicting support for redistribution ( $\beta = 0.14$ ), as well as discriminant validity from self-interest, compassion, and envy. Robustness was supported by a replication ( $N = 402$ ), yielding a significant and larger effect size ( $\beta = 0.25$ ) of egalitarian division with support for redistribution. We also examined support for coercive redistribution. In both studies, willingness to use coercive redistribution was predicted by egalitarian division fairness (S1  $\beta = 0.15$ , S2:  $\beta = 0.31$ ) and, independently, by instrumental harm (S1  $\beta = 0.21$ , S2:  $\beta = 0.16$ ). These motives expand the three-player model to include fairness and coercive enforcement, and suggest applications of evolution in developing better political, economic, and ethical knowledge. Evolved motives accounted for ~45 % of support for redistribution.

## 1. Introduction

Praxagora: “Good. Now, I suggest that all things be owned by everyone in common and everyone should be able to draw a pay and have an equal standard of living. They should all draw pay from the same funds. Let’s have no more of this rich man-poor man stuff” (Aristophanes, 396 BC/2010).

Support for redistribution is a highly relevant social trait with large individual differences (McCaffery & Baron, 2004). Scientific understanding of support for redistribution was transformed by work showing powerful effects of a small set of evolved motives, particularly the “three-person two-situation” evolutionary model of economic redistribution proposed by Sznycer et al. (2017). This model identifies three core problems faced by a given person: 1) pursuing her own self-interest, but also 2) responding to others who are less well-off, or 3) who are more well-off. The model postulates that motives of self-interest, compassion, and envy have evolved to solve these three problems respectively, and empirical work shows they account for over 1/3rd of variance in support for redistribution (Lin & Bates, 2021; Sznycer et al., 2017). A fourth motive – a taste for fairness – is widely predicted to impact support for redistribution (Fehr & Schmidt, 1999; Starmans et al., 2017), and, while initial studies of fairness revealed “little or no effect on support for

redistribution” (Sznycer et al., 2017), strong, replicated support for a proportional fairness motive (Baumard et al., 2013) in support for redistribution has now been demonstrated (Lin & Bates, 2022). These researchers showed that mutualism reliably predicted lower support for redistribution over and above the three-player motives of compassion, envy, and self-interest.

Leading models of moral foundations suggest, however, not one, but two conventional uses of the term fairness (Atari et al., 2023). One maps to proportionality/mutualism, the other common use in social research maps to egalitarianism: Fairness defined as equal outcomes for all, with no special position for self or family. Here, we test if an egalitarian division motive could solve an additional problem within the three-player model: Egalitarian division generates results that are fair in the sense that no party would choose to switch outcome with another (Brams & Taylor, 1996) or as a child might put it “you cut, I’ll choose”. In two studies, we examine whether this fairness motive a) is evolutionarily viable, b) shows discriminant validity from the existing motives, especially compassion, and c) demonstrates additional predictive power by predicting support for economic redistribution over and above existing motives. We next briefly summarise the three-player model, introduce egalitarian division fairness, followed by two empirical studies of its effect on support for redistribution.

\* Corresponding author.

E-mail address: [tim.bates@ed.ac.uk](mailto:tim.bates@ed.ac.uk) (T.C. Bates).

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### 1.1. The three-player model of support for redistribution

Sznycer et al. (2017) suggested the “three-person two-situation model” as a framework for considering adaptations motivating to economic redistribution. In this model, the mind is adapted to process resource relations between three possible persons: The self, the less well-off other, and the better-off other. The first relationship, that to oneself, is argued to select for a self-interest motive leading individuals to support redistribution when this advantages themselves or their kin (Halpern, 2001; Weeden & Kurzban, 2016). The second relationship – that of the self to the less well-off is argued to have selected for a motivation to help, provided this has a low marginal cost (Kaplan et al., 2005). Experienced as compassion, this motive benefits the helper by increasing attention to their welfare by those who are kept dependent on them (Jaeggi & Gurven, 2013) and, because low-cost help enhances survival of group members by increasing group size, improving success in inter-group competition (Bernhard et al., 2006). Underpinning the third motive, better-off individuals are predicted to evoke the unpleasant feeling of malicious envy (Smith et al., 1996; Smith & Kim, 2007). This motivates harming the better off and evolves where competition for positional goods such as status incentivises improvement of one's relative position even at cost to oneself – “evolved spite” – as famously described by Hamilton (1964). The three-player model has proven highly productive. Sznycer et al. (2017) found these effects in multiple countries (Sznycer et al., 2017) and these have since been confirmed by independent research groups (Hansen, 2022; Lin & Bates, 2021). Jointly, these motives, along with mutualism (Baumard et al., 2013), account for over 40 % of variance in support for redistribution (Bates, 2022; Lin & Bates, 2022; Sznycer et al., 2017). While high, this value falls short of a complete explanation, suggesting still other motives may be in action. A leading candidate for this extra motive is egalitarian or equal-outcome fairness (Atari et al., 2023) and we turn to this next.

### 1.2. Fairness in the three-player model

An evolved fairness motive must 1) Solve a problem of survival and/or reproduction facing the organism in the ancestral environment; 2) Must specify a functional system of representations, regulatory variables and logic to solve the problems; and 3) Be demonstrated empirically as present in humans (Cosmides & Tooby, 2013). Research integrating fairness into the three-player model faces the additional constraint that fairness must show discriminant and additional predictive power over and above self-interest, compassion, and envy. While numerous types of fairness have been proposed (Cappelen et al., 2007), many overlap with existing three-player model motives: For instance if fairness simply repaired outcomes of bad luck, it would be redundant with compassion which fulfils this function (Alesina & Angeletos, 2005). A fairness motive within the three-player model, then, should be 1) Independent of the existing self-interest, compassion, envy, and mutualism/proportionality motives; 2) Solve an additional problem experienced in the ancestral environment, and 3) Be associated with increased support for redistribution. A promising candidate for such a fairness motivation is egalitarianism, a crucial moral foundation (Atari et al., 2023). The most recent update of the moral foundations theory recognises this equal division motive as distinct from mutualism or proportionality (Atari et al., 2023), a claim supported by independent structural modelling of the new scales (Zakharin & Bates, 2023). We next discuss evidence for an egalitarian motive as solving an evolutionary problem for humans.

Evidence for roughly equal division of benefits is among the most reliably documented in the archaeological record, e.g. in cooperative big game hunting where large prey provide a caloric bonanza in the form of hundreds of kgs of meat, taking as much as a dozen hours for butchering by teams of 7 or 8 hunters (Byers & Ugan, 2005). The chance of success in hunting such prey alone is minimal, so collaboration is incentivised. An equal division strategy incentivises players to act as a coalition in dividing the reward, which in turn selects for participation on

subsequent hunts (Smith et al., 2018). But how is this egalitarian division enforced? (rather than, say, domination by those who have more?). Boehm (2000) argued that this motive for egalitarian fairness evolved in small-scale pre-agricultural societies in which coalitions of the less-well off could effectively oppose individuals attempting to dominate rewards, thus enabling selection for a motive to capture the benefits of equal sharing (Boehm, 2000). While recognising that, if unopposed, dominating others and thus defending unequal outcomes can be a successful strategy (Pratto et al., 1994), Boehm (1993) observed that in small-group ethnographic studies, “counter-dominance” was universally observed, such that subordinated individuals form coalitions against individuals attempting to achieve dominance, with sanctions ranging from undermining reputations via gossip, through to verbal criticism/ridicule, exclusion from group activities (ostracism) or even exile from the group or even assassination.

If group members can coalition around status, i.e., identity-based cooperation, they can potentially form a powerful force. If one individual monopolizes goods which would on average benefit a coalition of initially less successful individuals if shared equally among them, members of this coalition are rewarded for organising to intimidate, depose, or, in extremis, even take the life of the more successful individual should they fail to share (Wrangham, 2018, 2019). Conversely, if a person attempts to monopolize benefits or fails to share equally, she risks invoking the wrath of not one player, but of a coalition of all (Boehm, 1999). Under such circumstances, a feeling of righteous indignation toward dominant players, and a feeling of timidity when facing a choice to accumulate such benefits may evolve. Perhaps because of the unique coalition requirements and benefits in status and money for a less well-off collective, this egalitarian fairness motive appears unique to humans (Ritov et al., 2023).

Erdal and Whiten (1994) provide additional evidence for counter-dominance in the form of vigilant sharing of large-game meat, utilising adaptations to detect cheating (e.g. Cosmides et al., 2005), as well as coalition forming allowing subordinates to join in punishing more powerful individuals attempting to monopolize resources. Erdal and Whiten (1994) outline a basis for selection for counter-dominance such that where multiple subordinates commit to undermining a dominant player, the fitness costs of maintaining dominance become excessive, rendering the dominance strategy untenable. In this situation, what evolves is an adaptation to detect, resent and to find distasteful unequal shares of resources (Boehm, 1993).

Developmental psychology also supports an early emergence of punishment of unfair distributions, with children 18–24 months of age able to share intent via pointing and joint gaze, collaborate, divide spoils equally (Warneken et al., 2011) and, by age five, children exhibit a sense of obligation to obey equal division, and punish those who defect from this group obligation (Tomasello, 2020). This application of the egalitarian motive to group members and third parties more generally is expressed in moral outrage at observed defections (Tomasello, 2014). Five-year-old children observing such defective resource allocations will punish the third-party violator (Jordan et al., 2014). There is thus evidence in humans for a motive for egalitarian division accompanied by feelings of obligation and supported by third-party punishment (Delton et al., 2012; Tomasello, 2014; Warneken et al., 2011).

Next, we move to study 1 where we conduct a pre-registered test of the effect of egalitarian fairness on support for redistribution.

## 2. Study 1

To test whether an egalitarian motive accounts for incremental support for redistribution in the three-person model, a measure of fairness is required. An important feature of a fairness motive is that it involves a motivation to see all players rewarded equally. An adverse reaction to less-good treatment of oneself compared to others *not* accompanied by an adverse reaction to unfair treatment of others (Schweinfurth & Call, 2021) would not, then, constitute a fairness

motive, but rather an adverse welfare trade off (Sell et al., 2009; Sznycer et al., 2022). Recent research (Kahane et al., 2018) has focussed on assessing this impartial sense of fairness as feeling the pleasure and wellbeing of others as at least somewhat equivalent to one's own – termed “*impartial beneficence*”. They distinguish between 1) the ‘positive’ goal of such decisions (impartial concern for the greater good) and 2) the ‘negative’ means of implementing these goals (a permissive attitude toward instrumental harm). Here, we use impartial concern for the wellbeing of all to measure the motive of egalitarian fairness – the motive to divide resources to leave no recipient wishing to exchange their share that of another. For clarity we use the term “*egalitarian fairness*” rather than “*impartial beneficence*”. A second, negative, motive aligned with egalitarian sharing – “*instrumental harm*” – we predict will be associated with willingness to coerce and inflict harm while achieving equality.

Kahane et al. (2018) developed and validated scales assessing these traits, showing that egalitarian fairness predicted philosophical worldview, empathic concern for others, concern for future generations, and a sense of identification with the whole of humanity. These same outcomes were negatively associated with instrumental harm, and this scale also correlated with psychopathy. They demonstrated convergent validity of the scales, with both egalitarian fairness and *instrumental harm* statistically significantly predicted how right (or wrong) it would be to, for instance, achieve a benefit (e.g., saving five people) by sacrifice one person. These two scales, then, allow us to test two hypotheses: 1) Egalitarian fairness will predict increased support for redistribution over and above self-interest, compassion, and malicious envy; 2) Instrumental harm will predict warrant coercion to achieve equal division.

A pilot study ( $n = 251$ ) supported the predicted relationship of egalitarian fairness with support for redistribution ( $t(247) = 4.46, p < .001, \beta = 0.23, CI95\% [0.13, 0.34]$ ). Based on this, we pre-registered and conducted study 1 to confirm these findings. We pre-registered five hypotheses: 1) Egalitarian fairness would predict support for redistribution (controlling for self-interest, compassion, and envy), 2) The known effects of envy, compassion, and self-interest on support for redistribution would replicate. 3) Unlike envy, egalitarian fairness would be associated with maximizing outcomes for the poor rather than with harming the rich. 4) Preference for harming the rich without commensurate benefit to the poor would be associated with malicious envy. 5) Egalitarian fairness would be unrelated to envy. Though we did not pre-register it, we also expected only modest associations of egalitarian fairness with self-interest and compassion. In addition, we wished to explore willingness to forcibly redistribute. To this end, we created a scale to measure support for coercive redistribution and tested if instrumental harm or egalitarian fairness increase this willingness to use force. For this purpose, 19-items were generated for instance “*People questioning redistribution of wealth should be punished*” and “*If the wealthy try to avoid tax, it would be permissible to use mild torture to reveal the money they are hiding from the poor*”. Development of this scale, and a refined, 5-item version used in study 2 are included in the supplementary material. Sample size was chosen based on exceeding the  $N$  required to detect effects of  $\beta = 0.15$  with 80 % power for a two-sided test. This was estimated at  $N = 346$ . Based on funds we decided to collect 403 subjects.

## 2.1. Method

### 2.1.1. Participants

A total of 403 participants were recruited (268 females, mean age 37 years,  $SD = 12.19$ ) using the Prolific Academic service. Prolific is a high-quality online service for recruiting participants and payment handling for participation (Douglas et al., 2023). We pre-registered a criterion that subjects who completed the questionnaire in  $<20$  s would be excluded. No subjects met this criterion. The sample was representative of the UK population in terms of ethnic and gender makeup, with participants identifying as White ( $n = 366; 90.8\%$ ), Black ( $n = 14; 3.5\%$ ),

Mixed ( $n = 14; 3.5\%$ ), Asian ( $n = 6; 1.5\%$ ) and other ( $n = 1; 0.2\%$ ), 2 participants (0.5 %) chose not to answer. The study was approved by the Ethics Committee of the department of psychology of the University of Edinburgh approved the implementation of the study and it was conducted in according to the principles expressed in the Declaration of Helsinki. All participants were fully informed about the study and provided informed consent to participate online documented in the form of an online button press.

### 2.1.2. Measures and procedure

Attitudes toward redistribution were measured with the 11-item support for economic redistribution scale (Sznycer et al., 2017). An example reverse-scored item is “*Wealthy people should not be taxed more heavily than others*”. Each item used a Likert response scale from 1 (strongly disagree) to 5 (strongly agree). The internal consistency reliability (Cronbach alpha) of economic redistribution in our sample was 0.90. Egalitarian fairness and instrumental harm were measured using the Oxford Utilitarianism Scale (Kahane et al., 2018). This 9-item instrument consists of two subscales: Impartial Beneficence, which we use to assess egalitarian fairness; An example item is “*It is just as wrong to fail to help someone as it is to actively harm them yourself*” and Instrumental Harm (example item: “*It is morally right to harm an innocent person if harming them is a necessary means to helping several other innocent people*”). Scores were on a Likert scale from 1 (strongly disagree) to 7 (strongly agree). In our sample, Cronbach Alphas were 0.63 and 0.69 for Impartial Beneficence and Instrumental Harm respectively.

Self-interest, compassion, and envy were measured as in Lin and Bates (2021). Self-interest used a single item: “*Imagine that a policy of higher taxes on the wealthy is implemented. What overall impact do you think the higher taxes on the wealthy would have on you?*” with responses on a 1 to 5 scale: My own economic situation would 1: significantly worsen; slightly worsen; stay the same; slightly improve; 5 significantly improve. The 10-item dispositional compassion scale (Goldberg, 1999; Sznycer et al., 2017) reliably (Cronbach Alpha = 0.80 in our sample) assesses compassion based on Likert responses from 1 (very inaccurate) to 5 (very accurate) to with an example item being “*I suffer from others' sorrows*”. The 5-item Lange and Crusius (2015) Malicious Envy scale includes items such as “*If other people have something that I want for myself, I wish to take it away from them*”, scored from 1 (strongly disagree) to 6 (strongly agree). The Cronbach Alpha of Malicious Envy was 0.80 in our sample.

Wealthy-harming preference was measured using a choice scenario (Sznycer et al., 2017). Scenario one (wealth harming) was “*The top 1% wealthiest individuals pay an extra 50% of their income in additional taxes, and as a consequence of that the poor get an additional £100 million per year (the extra 50% in taxes paid in former fiscal years leaving the wealthiest with relatively less taxable income)*”. Scenario two (helping the poor) was “*The top 1% wealthiest individuals pay an extra 10% of their income in additional taxes, and as a consequence of that the poor get an additional £200 million per year (the extra 10% in taxes paid in former fiscal years leaving the wealthiest with relatively more taxable income)*”.

Support for coercive redistribution was measured with a 19-item coercive redistribution scale generated for this study (see supplementary material detailing development of this scale and a refined, 5-item version used in study 2). Responses were on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). Factor scores on the first component of a factor analysis of this 19-item coercive redistribution scale were used.

Finally, demographic information, including age and gender, was collected through Prolific Academic, the participant recruit platform we used in this study. Subjects consented online to participate in the study, and then completed items presented through Qualtrics, an online survey system. The order of scales was as the same as we presented in this section. Subjects were paid £0.55.

## 2.2. Results

We first tested the prediction that egalitarian fairness would be associated with increased support for redistribution (controlling for self-interest, compassion, and envy). As Shown in Table 1, this association of egalitarian fairness with increased support for redistribution was significant ( $t(395) = 3.65, p < .001$ ) and in the predicted direction ( $\beta = 0.14, CI95\% [0.07, 0.22]$ ). Effects of the other motives were also confirmed, with significant ( $p < .001$ ) effects on support for redistribution for self-interest, compassion, and malicious envy (effects sizes  $\beta = 0.17, CI95\% [0.09, 0.24]$ ;  $\beta = 0.56, CI95\% [0.48, 0.64]$ ; and  $\beta = 0.22, CI95\% [0.14, 0.30]$  respectively). Thus, both hypotheses 1 and 2 were supported, with effects of all four motives on support for redistribution (see Fig. 1).

Hypothesis 3, that egalitarian fairness would be associated with maximizing outcomes for the poor rather than with harming the rich was tested using a binary logistic regression predicting support for a wealth-harming tax lacking commensurate benefit to the poor being predicted by egalitarian fairness and instrumental harm, controlling for age and gender, self-interest, compassion, envy, and support for redistribution. The predicted association of egalitarian fairness with maximizing outcomes for the poor was not found ( $z = -1.79, p = .072, odds ratio = 0.73, CI95\% [0.52, 1.03]$ ), though it fell in the predicted direction, with a 1-unit increase in egalitarian fairness associated with 27 % decreased odds of choosing the wealth-harming tax. By contrast the association of malicious envy with wealth-harming taxation was confirmed ( $z = 2.56, p = .010$ ), with a one-unit increase in envy associated with a 64 % increased preference for the wealth-destroying option (odds ratio = 1.64, CI95% [1.12, 2.40]).

### 2.2.1. Discriminant and incremental validity

We next tested the independence of egalitarian fairness effects from effects of compassion and envy (hypothesis 5). As shown in Table 2 and S3 in Supplemental Material, most of the variance in egalitarian fairness was independent of compassion and envy ( $r$ 's of 0.27 and 0.12 respectively). We should note that, as pre-registered, the framing of this hypothesis implied that the true correlation of egalitarian fairness with compassion and with envy is zero, and our results do not support that. What the data do support is that the effects of egalitarian fairness are not explained by confounding with compassion and envy: The incremental predictive value of egalitarian fairness on support for redistribution was robust to controlling for both compassion and envy, as well as for self-interest. This supports the role of egalitarian fairness as an independent influence on support for redistribution, without demonstrating complete independence among the motives, which was not our intent.

### 2.2.2. Forced redistribution

Next, we turned to our second hypothesis, that ends-justify-the-means reasoning would increase support for coercive redistribution. This was tested in a motivational model including compassion, envy, self-interest, egalitarianism as well as instrumental harm to predict

**Table 1**  
Regression models predicting support for redistribution in Study 1.\*

Variables	Model 1	Model 2
Age	0.06 [-0.02 0.13]	0.05 [-0.02 0.13]
Sex	-0.10 [-0.18-0.03] **	-0.10 [-0.17-0.03] **
Compassion	0.60 [0.53 0.68] ***	0.56 [0.48 0.64] ***
Envy	0.24 [0.16 0.32] ***	0.22 [0.14 0.30] ***
Self-interest	0.17 [0.09 0.25] ***	0.17 [0.09 0.24] ***
<b>Egalitarian fairness</b>	<b>0.14 [0.07 0.22] ***</b>	<b>0.14 [0.07 0.22] ***</b>
R <sup>2</sup>	0.428	0.446

Note. Effects are standardized regression coefficients [followed by 95 % CI].

\*\*\*  $p < .001$ .

\*\*  $<0.01$ .

\*  $<0.05$ .

support for coercion in redistribution (see Table 3). We expected that instrumental harm would be associated with scores on our new coercive redistribution scale. This was the case, with a significant, association in the predicted direction ( $\beta = 0.21, CI95\% [0.12, 0.31], t(394) = 4.26, p < .001$ ). Also as predicted, support for coercion predicted support for redistribution ( $r = 0.37, CI95\% [0.27, 0.44], t(401) = 7.89, p < .001$ ). Interestingly, malicious envy also predicted support for coercive redistribution ( $\beta = 0.26$ ). Given the desire of the envious to harm those better-off than themselves this association was perhaps predictable. Self-interest was also significantly linked to coercion ( $\beta = 0.19$ ). Compassion – which one might expect to be associated with reduced support for violent or coercive acts – failed to protect against coercive redistribution ( $\beta = 0.04$ ). Jointly, these motives accounted for 26 % of variance in willingness to coerce compliance with redistribution (see Fig. 2).

## 2.3. Discussion

Four of the five pre-registered hypotheses were supported, including the key prediction of an incremental role of egalitarian fairness in explaining support for redistribution. Jointly, the motivational model accounted for 44 % of variance in support for redistribution (see Fig. 1). The model also accounted for 26 % of variance in willingness to coerce compliance with redistributive policy, with strong effects of envy, and with instrumental harm also playing its predicted role based on ends-justify-the-means reasoning (Kahane et al., 2018). We next conducted a replication to confirm the robustness of these effects and investigate additional tests of validity.

## 3. Study 2

Study 1 confirmed the predicted effect of egalitarian fairness on support for redistribution. Instrumental harm was associated with support for coercive redistribution, as were malicious envy and self-interest. In Study 2, we wished to replicate these findings, conducting a close replication.

We also wished to extend discriminant validity for the egalitarian fairness measure by testing independence from alternative fairness constructs: specifically procedural fairness and distributional fairness. Procedural fairness refers to support for common procedural standards applied neutrally, and enforced for all individuals and groups (Shaw & Olson, 2014; Thibaut et al., 1973). Research shows that procedurally fair outcomes are more likely to be complied with (Gibson, 1989; Tyler et al., 2019), even if fairness leads to unequal outcomes (Gibson, 1989; Ku & Salmon, 2013). The second form of fairness we tested was “distributional fairness” – the preference for low variance options when choosing among distributional outcomes. Research in this field shows that individuals are more likely to reject divisions with a wide variance (Fehr & Schmidt, 1999). Prior studies have reported no association of support for redistribution with both procedural fairness (Lin & Bates, 2021; Sznycer et al., 2017) and distributional fairness (Sznycer et al., 2017). We wished to confirm these null results.

Our hypotheses for Study 2 were as follows: 1) We predicted that the associations of egalitarian fairness with support for redistribution and with coercive redistribution would replicate. 2) We further predicted that associations of procedural and distributional fairness with support for redistribution would again be estimated as near-zero and non-significant. We pre-registered these two main hypotheses and 8 related predictions described below in the results and recorded on [AsPredicted.org](https://AsPredicted.org). Sample size was matched to study 1, which was based on substantively exceeding the N required to detect effects of  $\beta = 0.15$  with 80 % power for a two-sided test ( $N = 346$ ), leading us to fund collection of 402 subjects.

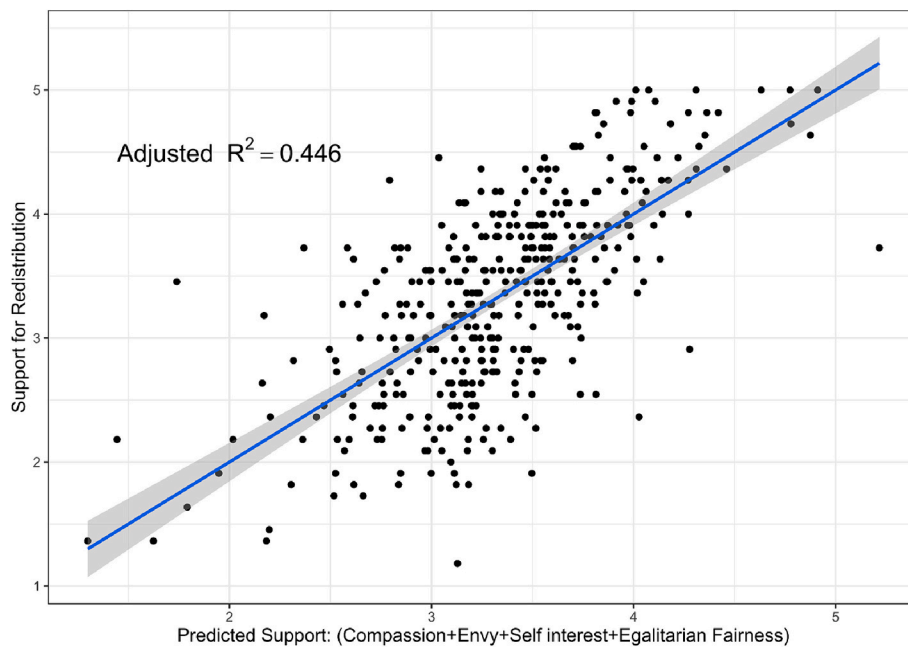


Fig. 1. Support for redistribution predicted from compassion, envy, self-interest, and egalitarian fairness, controlling for age and gender (Study 1).

Table 2  
Correlations among Study 1 Variables.

Variable	1	2	3	4	5	6
1 Support for redistribution	–					
2 Coercive redistribution	0.37***	–				
3 Compassion	0.58***	–0.01	–			
4 Envy	0.16**	0.38***	–0.15**	–		
5 Self-interest	0.29***	0.25***	0.15**	0.15**	–	
6 Egalitarian fairness	0.33***	0.26***	0.27***	0.12*	0.07	–
7 Instrumental harm	–0.12*	0.31***	–0.36***	0.29***	–0.04	0.21***

\*\*\*  $p < .001$ .  
\*\*  $<0.01$ .  
\*  $<0.05$ .

Table 3  
Coercive Redistribution predicted by motives of Malicious Envy, Self-interest, Egalitarian fairness, and Instrumental Harm (Study 1).

Variable	Effect (Beta)	t value (n = 403)
Age	–0.10 CI95% [–0.18, –0.01]	–2.14, $p = .033$
Sex	–0.08 CI95% [–0.17, 0.01]	–1.85, $p = .065$
Compassion	0.04 CI95% [–0.06, 0.14]	0.85, $p = .396$
<b>Malicious Envy</b>	0.26 CI95% [0.16, 0.35]	5.45, $p < .001$
<b>Self-interest</b>	0.19 CI95% [0.10, 0.28]	4.31, $p < .001$
<b>Egalitarian fairness</b>	0.15 CI95% [0.05, 0.24]	3.08, $p = .002$
<b>Instrumental Harm</b>	0.21 CI95% [0.12, 0.31]	4.26, $p < .001$
Adjusted $R^2 = 0.265$		

### 3.1. Method

#### 3.1.1. Participants

A total of  $N = 402$  UK participants were recruited (254 females, mean age 36 years,  $SD = 12.40$ ), again using Prolific Academic. We pre-registered a criterion that subjects who completed the questionnaire in  $<1$  min would be excluded. No subjects met this criterion. The sample was representative of the UK population, with participants identifying as White ( $n = 356$ ; 88.6 %), Asian ( $N = 28$ ; 7.0 %), Mixed ( $n = 12$ ; 3.0 %) and Black ( $n = 6$ ; 1.5 %). The study procedures were approved by the Psychology Research Ethics Committee at the School of Philosophy, Psychology & Language Sciences in the University of Edinburgh, and

participants gave informed consent.

#### 3.1.2. Measures and procedure

Support for redistribution, compassion, malicious envy, egalitarian fairness, and instrumental harm were all measured as in study 1. Demographic information (age and gender) was collected through Prolific Academic. Self-interest was measured with two items; the first item was as the same as in Study 1; the second was “Imagine that a policy of higher taxes on the wealthy is implemented. What do you think the impact on your ability to earn a living would be?”, with responses on a 1 to 5 scale from “My work and investment prospects would be significantly reduced” (1); slightly reduced (2); stay the same (3); slightly increased (4), significantly increased (5). In our sample the correlation of these items was 0.53 (CI95% [0.45, 0.59]).

Procedural fairness was measured with the 7-item procedural fairness scale (Sznycer et al., 2017). An example item is “Every group should be judged with the same yardstick”. Each item used a Likert response scale from 1 (strongly disagree) to 7 (strongly agree). The Cronbach Alpha of this scale in our sample was 0.61. Distributional fairness was measured with the 7-item income distribution selection task (Sznycer et al., 2017). On each item, participants were asked to choose between two alternatives for distribution of incomes among themselves, the rich (top 5 % income earners) and the poor (bottom 5 % income earners). Participants were told to treat the distribution of incomes as fixed now and for the indefinite future and to choose the option they preferred. The option

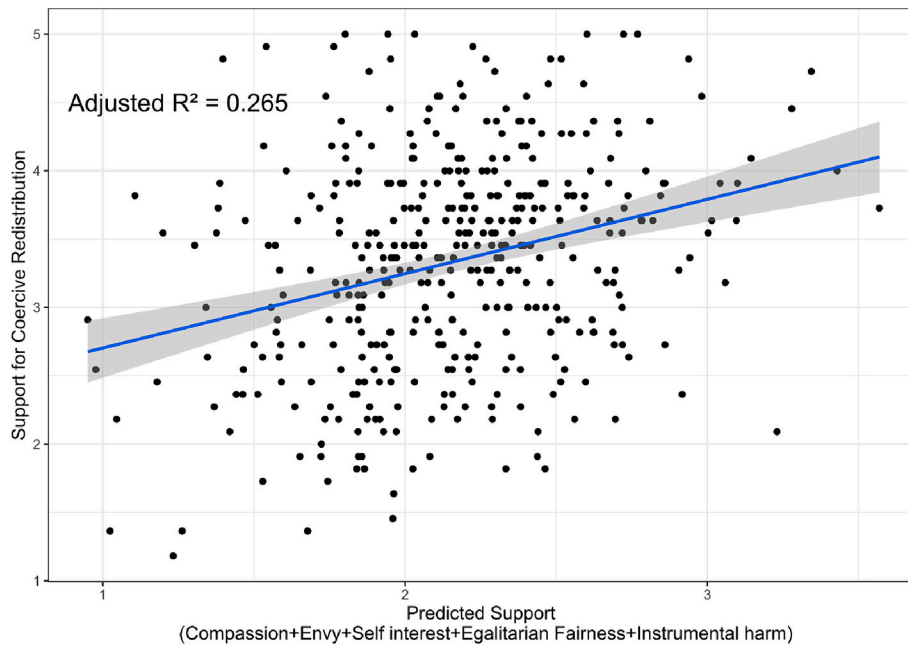


Fig. 2. Support for Coercive Redistribution predicted from compassion, envy, self-interest, egalitarian fairness, and Instrumental Harm, controlling for age and gender (Study 1).

with lower variance reflects endorsement of distributional fairness. Cronbach Alpha in our sample was 0.83.

To measure support for coercive redistribution we used an efficient 5-item version of the coercive redistribution items developed in Study 1 (see supplementary material for scale development). The items are shown in Table 4. Cronbach Alpha of this scale in our sample was 0.89.

3.1.3. Procedure

Subjects consented online to participate in the study, and then completed items presented through Qualtrics, an online survey system. The order of scales was as presented in above. Subjects were compensated £0.55.

3.2. Results

The descriptive statistics and correlations of main variables are shown in Table 6. All hypotheses were tested using multiple regression.

We first tested the predicted effect of egalitarian fairness on support for redistribution. This was confirmed, with a regression of egalitarian fairness on support for redistribution, controlling for self-interest, compassion, and envy, revealing a significant ( $t(395) = 5.95, p < .001$ ) effect in the predicted direction and larger than was found in study 1 ( $\beta = 0.25, CI95\% [0.17, 0.33]$ ). Egalitarian fairness thus significantly improved prediction of support for redistribution, explaining an additional 5 % of variance. As shown in Table 5 and Fig. 3, the effects of self-interest, compassion, and envy were confirmed also ( $t(396) = 5.50, p < .001$ ;  $t(396) = 11.14, p < .001$ ; and  $t(396) = 6.82, p < .001$ ) respectively).

Table 4  
Items of the 5-item Support for Coercive Redistribution scale (study 2).

Item
(1) The government should impose a brief period of oppression to carry out a transfer of wealth from the better off to the less well off.
(2) The government should, using force where needed, control the economy in order to redistribute wealth from the rich to the poor.
(3) The wealthy must understand that harm done to them is morally necessary as collateral damage in redistributing wealth.
(4) The government should forcibly redistribute wealth from those who have more resources to those who have fewer resources.
(5) If the wealthy try to avoid tax, it would be permissible to use mild torture to reveal the money they are hiding from the poor.

Table 5

Egalitarian fairness predicts support for redistribution, incrementally over and above Compassion, Envy, and Self-interest (Study 2).

Variable	Model 1**	Model 2
Age	-0.09 [-0.17-0.01]*	-0.09 [-0.17-0.01]*
Sex	-0.09 [-0.17 0.00] *	-0.09 [-0.16-0.01]*
Compassion	0.48 [0.39 0.56] ***	0.39 [0.31 0.48] ***
Envy	0.29 [0.21 0.38] ***	0.26 [0.18 0.34] ***
Self-interest	0.22 [0.14 0.31] ***	0.19 [0.12 0.27] ***
<b>Egalitarian fairness</b>		<b>0.25 [0.17 0.33] ***</b>
R <sup>2</sup>	0.350	0.402

Note. Effects are standardized regression coefficients [followed by 95 % CI].

\*\*\*  $p < .001$ .  
\*\*  $<0.01$ .  
\*  $<0.05$ .

3.2.1. Other kinds of fairness

We next tested the prediction that other forms of fairness would not be associated with support for redistribution when self-interest, compassion, and envy are controlled. Supporting this prediction, procedural fairness was not significantly linked to support for redistribution ( $\beta = 0.08, CI95\% [0.00, 0.16], t(395) = 1.9, p = .058$ ) not to support for coercive redistribution ( $\beta = -0.05, CI95\% [-0.14, 0.04], t(395) = -1.01, p = .315$ ). Distributional fairness, however showed a significant positive relationship with support for redistribution ( $\beta = 0.13, CI95\% [0.05, 0.21], t(395) = 3.07, p = .002$ ). However, it had no relationship to support for coercive redistribution ( $\beta = 0.00, CI95\% [-0.09, 0.09], t(395) = -0.05, p = .960$ ). In a regression, both malicious envy and compassion were significant predictors of distributional fairness ( $\beta =$

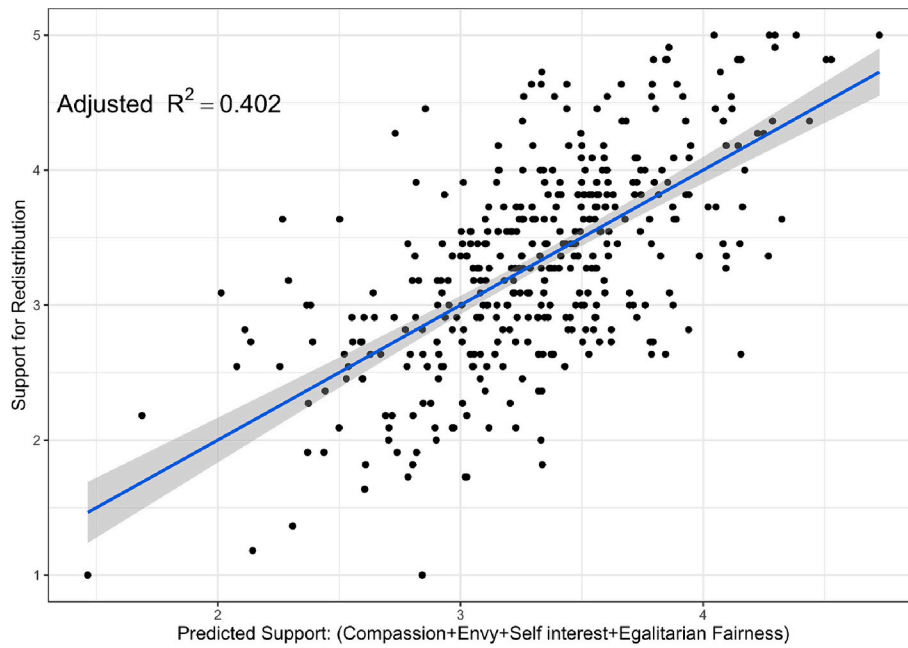


Fig. 3. Support for redistribution predicted from compassion, envy, self-interest, and egalitarian fairness, controlling for age and gender (Study 2).

Table 6  
Descriptive statistics and inter-correlations of Study 2 variables.

	Mean (SD)	1	2	3	4	5	6	7	8	9	10
1. Support Redistribution	3.32 (0.74)	–									
2. Compassion	3.70 (0.53)	0.41***	–								
3. Malicious Envy	2.32 (0.90)	0.25***	–0.21***	–							
4. Self-interest	3.01 (0.54)	0.29***	0.05	0.09	–						
5. Egalitarian Fairness	3.98 (1.06)	0.42***	0.31***	0.09	0.16**	–					
6. Instrumental Harm	3.56 (1.04)	–0.05	–0.14**	0.18***	0.03	0.21***	–				
7. Coercive Redistribution	2.31 (0.93)	0.51***	0.04	0.38***	0.27***	0.41***	0.29***	–			
8. Procedural Fairness	5.08 (0.80)	0.10*	0.21***	–0.20***	0.03	0.15**	–0.12*	–0.10*	–		
9. Distributinal Fairness	0.91 (0.19)	0.12*	0.14**	–0.18***	0.01	0.08	–0.07	–0.06	0.23***	–	
10. Age	–	–0.25***	–0.10	–0.26***	–0.15**	–0.08	–0.03	–0.27***	0.11*	0.10*	–
11. Gender	–	0.00	0.23***	–0.10*	–0.01	0.06	–0.17***	–0.06	0.09	0.07	–0.02

Note. The range of scores for Support for Redistribution, Compassion, Self-interest, and Coercive Redistribution were from 1 to 5; the range of scores for Malicious Envy was 1 to 6; the range of scores for Egalitarian Fairness, Instrumental Harm, and Endorsement of Procedural Fairness were 1 to 7; the range of scores for Endorsement of Distributinal Fairness was 0 to 1.

\*\*\*  $p < .001$ .  
\*\*  $<0.01$ .  
\*  $<0.05$ .

Table 7  
Predicting Support for Coercive Redistribution from Egalitarian Fairness and Instrumental Harm.

Variable	Model 1	Model 2
Age	–0.14 [–0.23–0.05] **	–0.14 [–0.23–0.06] ***
Sex	–0.05 [–0.14 0.04]	–0.03 [–0.11 0.05]
Compassion	0.10 [0.01 0.19] *	0.01 [–0.08 0.10]
Envy	0.34 [0.25 0.43] ***	0.27 [0.19 0.36] ***
Self-interest	0.21 [0.12 0.30] ***	0.17 [0.09 0.25] ***
Egalitarian fairness		0.31 [0.22 0.40] ***
Instrumental Harm		0.16 [0.08 0.25] ***
R <sup>2</sup>	0.221	0.349

Note. Effects are standardized regression coefficients [followed by 95 % CI].  
\*\*\*  $p < .001$ .  
\*\*  $<0.01$ .  
\*  $<0.05$ .

–0.18, CI95% [–0.27, –0.08],  $p \leq 0.001$  and  $\beta = 0.11$  [0.01, 0.21],  $t = 2.16$ ,  $p = .031$  respectively). Overall, we interpret these findings as not supporting our hypotheses: While it appears that even if distributinal fairness is in part a reflection of (or even cause of) malicious envy and compassion, its significant effect on support for redistribution controlling for these two motives leaves the door open for distributinal fairness as a further motivation for support for redistribution in the three-player model.

### 3.2.2. Support for coercive redistribution

Turning to support for coercive redistribution, replicating the result of study 1, increased support for coercive redistribution was again predicted by both instrumental harm (beta = 0.16, CI95% [0.08, 0.25],  $t(394) = 3.77$ ,  $p < .001$ ) and egalitarian fairness (beta = 0.31, CI95% [0.22, 0.40],  $t(394) = 6.87$ ,  $p < .001$ ). These effects were stable to inclusion of differing control variables. Both envy ( $t(394) = 6.22$ ,  $p < .001$ ) and self-interest ( $t(394) = 4.08$ ,  $p < .001$ ) also showed significant effects on support for coercive redistribution (See Table 7, Model 2). As in study 1, compassion was unrelated to coercive redistribution ( $t(394)$



= 0.31,  $p = .757$ ). Scores on the coercive redistribution scale were strongly correlated with support for economic redistribution ( $r = 0.51$  (CI95% [0.43, 0.58],  $t(400) = 11.92$ ,  $p < .001$ ). Jointly, the final motivational model accounted for 35 % of variance in willingness to coerce compliance with redistribution (see Fig. 4).

### 3.3. Discussion

This research had three main findings. First, in two pre-registered studies, egalitarian fairness reliably increased support for redistribution. Second, the effects of self-interest, compassion, and envy on support for redistribution were confirmed. Third, the research extended understanding by including a motive for coercive enforcement of redistribution. Jointly, the final motivational model accounted for over 40 % of variance in support for redistribution and over 30 % of variance in willingness to coerce compliance with redistribution. These results support the three-person model of evolved motives and expand it to include a motive for egalitarian fairness as well as a motive for coercive enforcement. We discuss these findings further below.

The main aim of the project was to find a form of fairness which strongly and reliably linked to support for redistribution. Egalitarian fairness met this criterion, with significant replicable effects on support for redistribution. This finding supports the proposal of an adaptive motive for egalitarian division of work products among group members and is compatible with evolutionary research showing that intent to share is monitored and that violations of this equal sharing are punished (Delton et al., 2012; Tomasello, 2019). The results support ideas of anti-dominance (Boehm, 1999) as a small-group adaptation for less successful majority to transfer resources from more successful or dominant individuals (Erdal & Whiten, 1994). Moreover, some light was shed on motives underlying coercive redistribution. Resource re-allocation involves removing a resource from a currently better-off resource holder, an aspect of fairness that has received little attention (Wrangham, 2018). We found reliable evidence for effects of instrumental harm, but also of egalitarian fairness, envy, and self-interest increasing willingness to coerce. Compassion failed to protect against coercion.

Together, these findings expand the network of psychological motives underlying support for redistribution. They show that redistribution arises from at least four motivational systems grounded in the

evolutionary three-person model, including, now, the egalitarian fairness motive originally designed to enable collaboration. The studies also reiterate the lack of relationship to redistribution of other types of fairness. Procedural fairness showed no link to redistribution, while distributional fairness showed some effect, but was also plausibly interpreted as a reflection of compassion and envy, i.e., a measure of preference for increasing the wealth of the worse off or decreasing the wealth of the better off. This interpretation is compatible with the finding by Sznycer et al. (2017) that these fairness concepts did not increase support for redistribution. A reviewer highlighted the high mean of distributional fairness. Given this potential ceiling effect, and some evidence for it influencing support for redistribution, further investigation of measures of distributional fairness and correlates with support for redistribution is warranted.

### 4. Limitations and future directions

One limitation is common to observational survey research, namely measures may be subject to social desirability biases or other causes not distinctive of the specific measure used. For instance, envy may be masked by social desirability. Therefore, testing and ruling out such effects would be useful. Given the imperfect reliability of some measures, especially distributional fairness, it will be important to develop measures which improve this also. Both increase reliability and validity could potentially increase effect sizes. It will be of value to test the findings using different methods, for instance real-world tests of cooperation in groups. Finally, while cultural norms of emotional expression may vary, we predict that the findings should be present across cultures and testing this would be valuable as it is a risky test that could refute the theory.

The results suggest directions for future research. For instance, here, we tested three forms of fairness, but many more forms of “fairness” have reached wide use – over two-dozen in fact (Corbett-Davies & Goel, 2018). One or more of these may play a role in support for redistribution. For instance, a motive to favour one's in-group (Lewis & Bates, 2010; Zakharin & Bates, 2021) may lead to a taste for demographic equality – the motivation to increase outcomes for one's self-identified group (Dawes et al., 2007) versus a motive to reduce existing group differences in outcomes (Berger et al., 2022). Moreover, “mutualism”

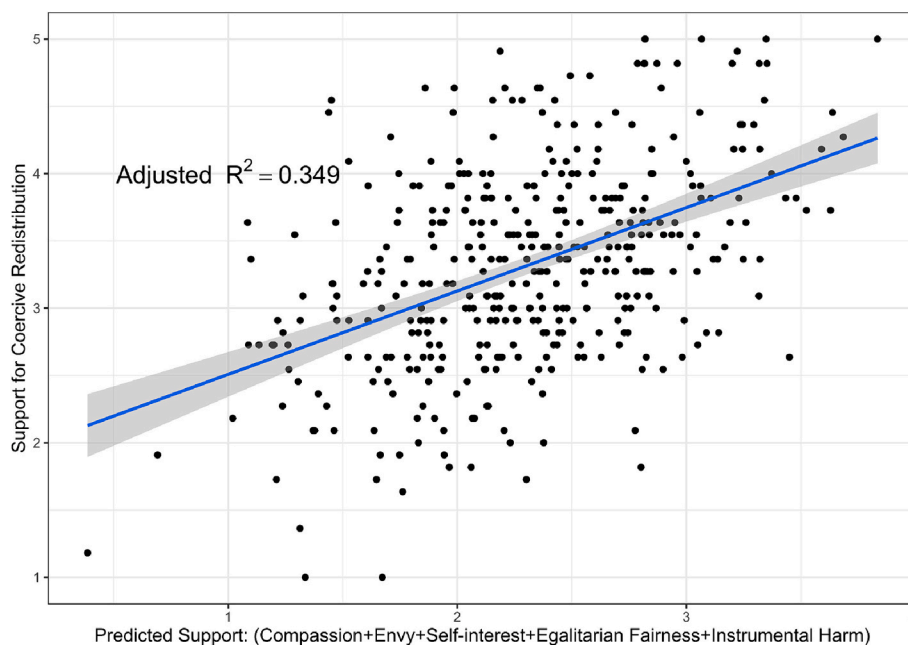


Fig. 4. Support for coercive redistribution predicted from compassion, envy, self-interest, egalitarian fairness, and instrumental harm, controlling for age and gender (Study 2).

(reciprocal cooperation fairness: Baumard et al., 2013) has been shown to increase support for redistribution (Lin & Bates, 2022). Finally, alongside egalitarian fairness, a taste for coercion also increased support for redistribution. An important avenue for research will be to understand how fairness can lead to atrocities (e.g., Shaw & Knobe, 2013).

Important uncertainty remains in the model. We assume counter-dominance preventing monopolisation and motivating offers of equal shares to group members. Empirically, this could be investigated, testing if impartial beneficence is associated with aversion to being subordinated or with willingness to enforce sharing by the more successful, or both. Progress will also require development and study of measures of the counter-dominance motive itself. Work is ongoing refining the concept of counter-dominance (Boehm, 1993; Erdal & Whiten, 1994), e.g., Wrangham (2018) has conceptualised this as proactive aggression as opposed to reactive aggression and this may provide avenues to construct measures of willingness to pro-actively aggress against individuals dominating resources. One could then test association of such measures with the egalitarian fairness scale. Egalitarian division may also support the creation of public goods (e.g., subsidizing natality so the community can, for example, have strength in numbers when facing aggressive neighbours), or merely assuring that what goods are created enter the public domain and are shared equally among group members. Whether egalitarian division does in fact overcome problems entailed in public good creation to induce their production, or if it merely causes spoils to be shared, possibly disincentivising creation of value, is important to confirm.

Finally, the findings may have applications in experimental philosophy. For instance, in ethics philosophical debates could be informed by the evolved motives of the three-player framework. To take one example of many, Popper (1945) supported the moral call of a suffering person (compassion) but railed against both hedonic maximization (egalitarian division) and coercion (instrumental harm), linking the former as in part causal of the latter, with both open to use in defending lying, suppressing truth, on to violence.

## 5. Conclusion

To conclude, the results show significant roles for egalitarian division and a taste for coercion in economic redistribution. This may warrant expanding the three-person motivational model to include these motives alongside self-interest, compassion, and malicious envy. The evidence uncovered across the studies appears sufficient to motivate additional research incorporating this potentially species-unique egalitarian motive (Tomasello, 2019), perhaps originating as a solution to collaborative interaction (Delton et al., 2012).

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## Dedication

We dedicate this paper to the memory and work of the late John Tooby (1952–2023).

## Ethical statement

All subjects were aged over 18 years old. Participation was voluntary and subjects received a small compensation. The Ethics Committee of the department of psychology of the University of Edinburgh approved the implementation of the present study. The present study was conducted in according to the principles expressed in the Declaration of Helsinki. All participants were fully informed about the study and provided informed consent to participate online documented in the form of

an online button press.

## CRedit authorship contribution statement

**Chien-An Lin:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. **Timothy C. Bates:** Writing – review & editing, Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

I have shared the OSF link of all data and scripts

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2024.112684>.

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