Income Inequality Predicts Competitiveness and Cooperativeness at School

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Competitiveness and cooperativeness are important predictors of social and learning outcomes at school. Drawing on evidence suggesting that contexts with high income inequality foster an ethos of competitiveness and inhibit cooperativeness in the economic environment, we examine whether income inequality is also associated with more competitiveness and less cooperativeness in the academic environment. We conducted four preregistered studies to test this idea. In Study 1, analysis of the OECD PISA 2018 data set (≈500,000 15-year-old students from 75 countries) revealed that students from economically unequal countries perceive their schoolmates as more competitive and less cooperative. In Study 2a and 2b, analysis of the PISA 2003 (250,000+ students from 38 countries) and PISA 2000 (75,000+ students from 32 countries) data sets revealed that students from unequal countries are themselves more competitive and, surprisingly, also more cooperative. Follow-up analyses resolved this apparent paradox, showing that students from unequal countries are oriented toward instrumental rather than intrinsic cooperativeness (i.e., using cooperation as a strategic tool to achieve academic success rather than for the enjoyment of the activity itself). Study 3 offers a conceptual experimental replication (≈850 young adults imagining going back to school) and indicates that induced income inequality (a) increases perceived competitiveness, (b) decreases perceived cooperativeness, (c) prompts an orientation toward competitiveness, and (d) prompts an orientation toward instrumental rather than intrinsic cooperativeness. Results are discussed in relation to the multidisciplinary literatures on the psychology of income inequality, the selective function of school systems, coopetition, self-determination, and cooperative learning.

Educational Impact and Implications Statement
Individuals residing in places with high income inequality have been shown to compete more fiercely for status and cooperate less. In this research, we examine whether this phenomenon also applies to students at school. Analyses of three OECD PISA data sets (≈850,000 students from a total of 75+ countries observed in 2018, 2003, and 2000) show that 15-year-old students from economically unequal countries (a) perceive their schoolmates as more competitive and less cooperative and (b) are more competitive and more strategically cooperative (i.e., they use cooperation as a tool to achieve academic success). An experiment manipulating income inequality (≈850 young adults) led to the same conclusions. Taken together, our results suggest that income inequality fosters an ethos of competitiveness among the workforce of tomorrow.

Keywords: income inequality, social perception, academic motivation, competitiveness, cooperativeness

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The extent to which students perceive their classmates as competitive or cooperative, and their own orientations toward competitiveness and cooperativeness, are important predictors of social and learning outcomes (for reviews, see Butera et al., 2021; Elliot, 2020; Johnson & Johnson, 2021). Existing research on predictors of competitiveness and cooperativeness at school focus mainly on personal factors (e.g., social comparison tendencies), relational factors (e.g., relationship closeness), and task-based factors (e.g., incentive structures; for reviews see Garcia et al., 2013; Schneider et al., 2011). Herein we adopt a broader perspective and focus on a higher-level, macroeconomic factor: national income inequality.

Over the past decade, social scientists have begun to thoroughly investigate how residing in economically unequal contexts affects psychological outcomes (for a review, see Buttrick & Oishi, 2017). A mounting body of evidence indicates that income inequality fosters an ethos of competitiveness in the economic environment (Rodríguez-Bailón et al., 2020) whereby individuals are prone to vie against one another for wealth/status (Payne et al., 2017; Walasek & Brown, 2015) and cooperate less (Nishi et al., 2015). In the present research, we investigate whether this phenomenon also occurs in the academic environment, *before* individuals enter the labor market. Specifically, we examine the question: Is income inequality associated with more competitiveness and less cooperativeness at school?

Competitiveness and Cooperativeness at School

Competitiveness and cooperativeness at school can be conceptualized in two different ways: (a) as a characteristic of the perceived academic environment (perceived competitiveness and cooperativeness), and (b) as a characteristic of students (their orientation toward competitiveness and cooperativeness; Connelly et al., 2014). *Perceived competitiveness and cooperativeness* represent subjective construals of the competitive or cooperative nature of the achievement setting (Ames & Archer, 1988; Deutsch, 1949; Karabenick, 1994), whereas *orientations toward competitiveness and cooperativeness*[1] represent personal preferences to compete or cooperate with others in achievement settings (Horney, 1937/2013; Smither & Houston, 1992; Spence & Helmreich, 1983). Notably, these two theoretical constructs are interrelated. Perceiving others as being oriented toward competitiveness or cooperativeness influences one's own orientations via motivational contagion processes (e.g., for competitiveness, see King & Mendoza, 2020; for cooperativeness, see Dik & Aarts, 2007). Conversely, being oriented toward competitiveness or cooperativeness influences the perceptions of others' orientations via social projection processes (e.g., for competitiveness, see Elliot et al., 2018; for cooperativeness, see Krueger et al., 2012).

Competitiveness and cooperativeness shape how students navigate the social context of schools. On the one hand, competitiveness creates *negative* social interdependence in which the academic success of others is seen as an impediment to one's own success; as such, it is not surprising that competitiveness often predicts undesirable peer interaction outcomes, such as intolerance for disagreements, information withholding, and tactical deception (for a review, see Butera et al., 2021). On the other hand, because cooperativeness creates *positive* social interdependence in which the academic success of others is seen as a catalyst of one's own success, it is also not surprising that interventions designed to increase cooperativeness have been found to predict positive peer interaction outcomes, such as esprit de corps, social cohesiveness, and support for others (for a meta-analysis, see Roseth et al., 2008). However, based on Piagetian and Vygotskian social constructivist perspectives in which peer interactions are considered vital to the development of intersubjectivity and the promotion of learning (Tenenbaum et al., 2020), researchers have long posited that competitiveness and cooperativeness are detrimental and beneficial for achievement, respectively (for early work, see Johnson & Johnson, 1974). However, current meta-analytic evidence suggests that competitiveness may exert both negative and positive effects on achievement (Murayama & Elliot, 2012), whereas cooperative learning procedures do exert positive effects on achievement (Kyndt et al., 2013), particularly for disadvantaged students (Zeneli et al., 2016).

Given how important competitiveness and cooperativeness are to social and learning outcomes, considerable research effort has been devoted to examining their predictors (Schneider et al., 2011). Evidence from multiple lines of research demonstrates that competitiveness and cooperativeness are predicted by a number of factors at the person-level (e.g., heritability; Cesarini et al., 2008; Olson et al., 2001), family-level (e.g., parents' socioeconomic status; Almås et al., 2016; Bauer et al., 2014), dyad-level (e.g., same-sex vs. mixed-sex interactions, Balliet et al., 2011; Sutter et al., 2009), group-level (e.g., small-sized vs. medium-sized working groups; Alencar et al., 2008; Garcia et al., 2013), teacher-level (e.g., evaluation-related instructional practices; Meece et al., 2006; Slavin, 2017), classroom-level (e.g., autonomy-supportive classroom climate; Lerdpornkulrat et al., 2018; Owens & Barnes, 1982), and school-level (e.g., private vs. public schools; Marks, 2009). In the present research, we adopt a different, broader perspective, and investigate whether competitiveness and cooperativeness are also predicted by a particular country-level factor: income inequality.

Income Inequality, Competitiveness, and Cooperativeness

Across Organization for Economic Cooperation and Development (OECD) countries, the income of the lower and middle classes has increased modestly over the past 30 years, while the income of the upper class has surged to historic highs (OECD, 2019d). These differences have led to a return to levels of income inequality not seen since the postwar era (Atkinson, 2003). Given the scale of this phenomenon, scholars have raised the question of the psychological consequences of income inequality, in particular its influence on the way that people perceive and interact with others (for a review, see Rodríguez-Bailón et al., 2020).

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[1] Orientations toward competitiveness and cooperativeness are arguably akin to the well-established concept of *trait competitiveness* (Brown et al., 1998) and the emerging concept of *trait cooperativeness* (Thielmann & Hilbig, 2014; see also Cloninger, 1993), respectively. In the present work, we favor the term "orientation" over "trait," because traits are more likely to be seen as cross-situational, enduring dispositions, despite the fact that personality traits are known to be especially unstable during adolescence (Borghuis et al., 2017; the target populations for Studies 1, 2a and 2b) and early adulthood (Bleidorn, 2015; the target population for Study 3).

Income Inequality, Competitiveness, and Cooperativeness in the Economic Environment

Income inequality has long been thought to increase the level of economic segmentation (Wilkinson, 1997). When income inequality is high, the poor and the rich are further apart on the pay scale, which makes standards of income comparison more salient. Accordingly, individuals feel more concerned about their relative income (Präg et al., 2014), show greater attention to markers of wealth like luxury brands (Walasek et al., 2018; Walasek & Brown, 2015, 2016), and are particularly vulnerable to the negative psychological effects of having a disadvantaged socioeconomic status (Schneider, 2019; Sommet et al., 2018).

As income inequality heightens the subjective importance of status, it promotes the perception that everyone around oneself competes for status and cooperates less. Observational (i.e., nonexperimental) evidence indicates that people residing in more unequal areas perceive their fellow residents as being more prone to competitiveness (Sommet et al., 2019), and that income inequality can disrupt the social fabric and break the norms of reciprocity that facilitate cooperation (Kawachi & Kennedy, 1999; but see Kim et al., 2021). Experimental evidence confirms this twofold tendency: When participants are asked to imagine living in a society with high rather than low levels of income inequality, they picture their fellow inhabitants as being more likely to care about personal success, social recognition, and competitiveness, rather than the welfare of others, social justice, and cooperativeness (Cheng et al., 2021; Melita et al., 2021; Sánchez-Rodríguez et al., 2020; Sánchez-Rodríguez et al., 2019).

The way that people from unequal contexts perceive the motivation of others also affects their own orientation toward competitiveness and cooperativeness. As people residing in more unequal areas perceive others as more oriented toward competitiveness, they come to endorse the competitive goal of being richer than others (or, at least, not being poorer than others; Sommet et al., 2019). Converging evidence from a broad range of disciplines reveals that people in contexts with high income inequality make riskier financial decisions (Mishra et al., 2015; Payne et al., 2017), borrow more money (Christen & Morgan, 2005; Fligstein et al., 2017), and work longer hours (Alexiou & Kartiyasa, 2020; Bowles & Park, 2005), arguably to keep up with the economic competition (Paskow et al., 2013; see also Du, Chen, Li, et al., 2021). Conversely, people in contexts with *low* income inequality have a greater dislike for competitive groups (Durante et al., 2013), a higher level of agreeableness (a personality trait associated with cooperativeness; de Vries et al., 2011), and an increased tendency to cooperate in economic games (Côté et al., 2015; Nishi et al., 2015; Rosenbaum et al., 2016; but see Schmukle et al., 2019). Herein we argue that income inequality is not only associated with more competitiveness and less cooperativeness among economic agents in the economic environment, but also among the workforce of tomorrow in the academic environment.

Income Inequality, Competitiveness, and Cooperativeness in the Academic Environment

From a sociological perspective, school systems serve two main functions: (a) an educational function (preparing all students to be contributing members of society), and (b) a selective function (directing the best students to the best positions in society; Darnon et al., 2009; Dornbusch et al., 1996). To fulfill the selective function, schools assess, compare, and sort students according to meritocratic principles (Batruch, Autin, & Butera, 2019). In doing so, schools rely on several institutional tools such as grading (Pulfrey et al., 2011), pass/fail-criteria (Meyer et al., 2009), or ranking (Sommet et al., 2013). These tools are used to stream students into educational tracks with different requirements (Batruch, Autin, Bataillard et al., 2019), that in turn lead to curricula of different durations (Chmielewski, 2014), that prepare individuals for careers with different levels of income (OECD, 2019a). As such, schools have been compared with social sorting machines that gatekeep "access to highly compensated, high-status occupations" (Domina et al., 2017, p. 316).

From there, it is easy to imagine how income inequality may structure the academic competition for positions in stratified societies: When the gap between low- and high-income groups widens, so does the pressure to obtain the best grades, to be admitted to the most prestigious universities, and to join the highest income group possible. When income inequality is high, students may realize by themselves the critical importance of academic competition, or— perhaps more plausibly—their family members might change their emphasis, discourse, and/or socialization practices to stress the importance of getting ahead of the academic competition (for work showing how income inequality affects parenting style, see Doepke & Zilibotti, 2019). It is also possible that school staff and, in particular, teachers (the main agents of school systems) may adopt normative assessment practices rather than cooperative learning practices (e.g., using reward focused on individual outcomes rather than team efforts) because they feel it will help their students succeed in high-stake tests, and reach the highest possible rung of the social ladder (for a review on teachers as institutional gatekeepers, see Butera et al., 2021, for a review on the effect of high-stake testing on teaching, see Wei, 2017). Importantly, these practices go hand in hand with encouraging (or emphasizing) social comparison, relative performance, and individual achievement (for a review on classroom goal structure, see Meece et al., 2006), which are noticed by students and shape their motivations (Bardach et al., 2020, 2021). Thus, when income inequality is high, it is possible that students will perceive more competitiveness and less cooperativeness in their school *and* become more competitive and less cooperative with one another.

Overview and Hypotheses

We conducted four preregistered studies to test the relationships between income inequality and competitiveness/cooperativeness at school. The first three studies used observational data from the OECD Program for International Student Assessment (PISA) studies, a series of cross-national surveys of representative national populations of 15-year-old students. Specifically, Study 1 used the data from PISA 2018 (approximately half a million students from 75 countries) to test the prediction that national income inequality is associated with the *perception* that one's schoolmates are more competitive (Hypothesis 1A) and less cooperative (Hypothesis 1B). Studies 2a and 2b used the data from PISA 2003 and PISA 2000 (approximately a third of a million students from 38 and 32

countries, respectively) to test the prediction that national income inequality is associated with a stronger *orientation* toward competitiveness (Hypothesis 2A) and a weaker *orientation* toward cooperativeness (Hypothesis 2B). We choose to work with PISA 2018, 2003, and 2000 because they are the only three PISA studies that assess perceptions of or orientations toward both competitiveness and cooperativeness, and we wanted to run as many large-scale replications as possible.

The fourth study used experimental data. Participants 18 to 29 years old were asked to imagine going back to school in a society with either high income inequality (experimental condition) or low income inequality (control condition). Our aim was to conceptually replicate the effects of income inequality on perceived competitiveness and cooperativeness observed in Study 1, as well as the effects of income inequality on orientations toward competitiveness and cooperativeness observed in Studies 2a and 2b.

For all studies, the analyses were planned a priori (unless otherwise specified), and all data exclusions and variables analyzed are reported. Preregistration documents, complete materials, raw economic/experimental data (or instructions to retrieve the secondary survey data), and Stata scripts and log files reproducing the findings are on the OSF: https://osf.io/mz3tn/.

Study 1 (PISA 2018): Income Inequality and Perceived Competitiveness/Cooperativeness

In Study 1, we aimed to test the following preregistered hypotheses: "Income inequality is a positive predictor of perceived competitiveness (Hypothesis 1A) and a negative predictor of perceived cooperativeness (Hypothesis 1B)" (see "Preregistration (PISA) 2018.pdf" on https://osf.io/mz3tn/).

Method

Participants

We used the data from PISA 2018 to test our hypotheses. As indicated in the preregistration, we retained all countries with nonmissing values for income inequality (100% of countries) and all students with nonmissing values for perceived competitiveness and/or cooperativeness (81.11% of students). The final sample comprised 496,455 students from 20,643 schools and 75 countries (for sample characteristics, see Table 1). The sample size was sufficient to detect a small-sized effect of income inequality with a power of .99+ (for the sensitivity analysis, see the online supplemental materials [p. ii]).

Variables

Income Inequality. We used the Gini coefficient, a commonly used measure of income inequality that can range from 0 (perfect equality: Everyone in the country has the same income) to 1 (perfect inequality: A single person in the country has all of the income). We acquired the Gini coefficients for each country from the World Income Inequality Database (WIID; UNU-WIDER, 2021). As indicated in the preregistration, we used the 2018 Gini coefficients or the next most recent estimates if the 2018 estimates were not available ($M = .35 \pm .08$).

Perceived Competitiveness and Cooperativeness. We used PISA's four-item measures of perceived competitiveness (e.g., "[In my school] it seems that students are competing with each other") and cooperativeness (e.g., "[In my school] it seems that students are cooperating with each other"; response options ranged from 1 = *Not at all true* to 4 = *Extremely true*). The PISA team adapted these measures from Murayama and Elliot (2012) and described them as assessing how much "students perceive that other students at the school compete with each other" and "cooperate with each other," respectively (see OECD, 2019b, p. 120). We averaged the four competitiveness items to obtain a measure of perceived competitiveness ($\bar{\alpha} = .82 \pm .04$, $M = 2.56 \pm .72$, $\text{ICC}_{country} = .06$ [.04, .08], $\text{ICC}_{country|school} = .09$ [.08, .11]) and the four cooperativeness items to obtain a measure perceived cooperativeness ($\bar{\alpha} = .85 \pm .55$, $M = 2.69 \pm .73$, $\text{ICC}_{country} = .04$ [.03, .08], $\text{ICC}_{country|school} = .09$ [.08 .10]).[2] The correlation between the two measures was $r = .27$, $p < .001$.[3]

Results

Overview of Analyses

We treated students (level-1 units) as nested in schools (level-2 units) and countries (level-3 units). We regressed each outcome (perceived competitiveness or cooperativeness) on income inequality while excluding or including a preregistered set of four commonly used student-level control variables (age, sex, origin, social class background) and five country-level potentially confounding variables (national population, GDP, poverty, unemployment, and expenditure on education). We used multiple imputation by chained equations (MICE) with 10 imputed data sets to account for missing values on the control variables. Tables 2 and 3 present the full results and regression equation for the main analyses.[4]

Main Preregistered Analyses

Consistent with Hypothesis 1A, the higher the income inequality, the higher the perceived competitiveness, $\beta = .07$ [.02, .13], $p = .008$, and $\beta_c = .08$ [.01, .15], $p_c = .019$ (in this and the subsequent studies, subscript c identifies statistical estimates pertaining to the models including control variables). Moreover, consistent with Hypothesis 1B, the higher the income inequality, the lower the perceived cooperativeness, $\beta = -.04$ [−.09, .01], $p = .082$, and $\beta_c = -.07$ [−.13, −.02], $p_c = .009$ (for a graphical representation of the findings, see Figure 1). In this and the other PISA studies, we preregistered *additional* analyses testing the

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[2] $\bar{\alpha}$ refers to the pooled within-country Cronbach's alpha; $\text{ICC}_{country}$ refers to the level-3 intraclass correlation coefficient (e.g., 6% of the variation in perceived competitiveness is explained by between-country differences); $\text{ICC}_{country|school}$ refers to the level-2 intraclass correlation coefficient (9% of the variation in perceived competitiveness within countries is explained by between-school differences); numbers in brackets represent 95% confidence intervals.

[3] In this and the subsequent observational studies, we used cluster-adjusted standard errors to calculate the p-value of the correlation coefficient.

[4] As indicated in the preregistration, we used Cook's distance to identify highly influential higher-level observations. In this and the two subsequent studies, the results were the same with and without influential countries.

Table 1

Studies 1 and Studies 2a–2b: Description of the PISA 2018, 2003, and 2000 Samples and Variables

Variable	Study 1 PISA 2018	Study 2a PISA 2003	Study 2b PISA 2000
Student-level sample characteristics			
M age	15.79 ± 0.29	15.80 ± 0.28	15.67 ± 0.34
Percent of boys	50.29%	49.24%	48.78%
Percent of native students	87.97%	91.64%	91.42%
Percent with ≥ 1 college-educated parent(s)	58.56%	42.33%	62.58%
Country-level sample mean characteristics			
National population (millions)	53.10 ± 167.48	45.68 ± 67.04	37.52 ± 167.48
GDP per capita (2010 USD, thousands)	26.26 ± 23.76	31.30 ± 22.68	29.92 ± 23.49
Unemployment rate	6.61% ± 4.30	8.55% ± 6.22	8.02% ± 6.07
Poverty ratio at 2011 PPP $1.90 a day	0.99% ± 1.48	2.12 ± 4.96	1.62% ± 3.35
Share of GDP spent on education	4.57% ± 1.38	4.83 ± 1.41	4.72% ± 1.27

Note. Country-level control variable estimates were collected from the World Bank. GDP = gross domestic product; PPP = purchasing power parity.

downstream effects of income inequality via competitiveness and cooperativeness on various outcomes. The results—which were inconclusive—are presented in the online supplemental materials [p. iii–v].

Additional Nonpreregistered Analyses

We did not anticipate one issue in the preregistration: When the 2018 income inequality estimates were not available, the next most recent estimates were sometimes quite far in the past (for about 20% of the countries, they were older than two years). We therefore repeated the analyses without using income inequality estimates older than two years (61 of 75 countries were retained in the analyses). We observed the same pattern of findings (for the full results, see Table S1) and we fixed the problem in Studies 2a and 2b by preregistering that we would not use income inequality estimates older than two years.

Discussion

In Study 1, we showed that income inequality is associated with the *perception* that one's schoolmates are more competitive (consistent with preregistered Hypothesis 1A) and less cooperative (consistent with preregistered Hypothesis 1B). In Studies 2a and 2b, we examined whether income inequality is associated with a different *orientation* toward competitiveness and cooperativeness. Study 2a used the data from PISA 2003, a survey that focused on a specific subject area, namely mathematical literacy; hence, it included assessments of *domain-specific* orientations toward competitiveness and cooperativeness. However, Study 2b used the data from PISA 2000, a survey that did not focus on any specific subject area; hence, it included assessments of *domain-general* orientations toward competitiveness and cooperativeness. Note that the differentiation between domain-specific and domain-general outcomes was not theoretically driven, but rather was a mere function of the fact that the PISA team decided to change the focus of their assessment. However, given our belief that income inequality fosters a general ethos of competitiveness and inhibits cooperativeness across the board, we expected both studies to produce similar results.

Studies 2a (PISA 2003) and 2b (PISA 2000): Income Inequality and Orientation Toward Competitiveness/ Cooperativeness

In Studies 2a and 2b, we aimed to test the following preregistered hypotheses: "Income inequality is a positive predictor of competitiveness [Hypothesis 2A] and a negative predictor of cooperativeness [Hypothesis 2B]" (see "Preregistration (PISA 2003-00).pdf" on https://osf.io/mz3tn/).

Method

Participants

We used the data from PISA 2003 (Study 2a) and PISA 2000 (Study 2b) to test our hypotheses. As indicated in the preregistration, we retained all countries with nonmissing values for income inequality (96.34% of countries across studies) and all students with nonmissing values for competitiveness and/or cooperativeness orientation (86.26% of students across studies). The final samples comprised 259,759 students from 9,907 schools and 38 countries (Study 2a) and 77,498 students from 5,440 schools and 32 countries (Study 2b; for sample characteristics, see Table 1). The sample sizes were sufficient to detect a small-sized effect of income inequality with a power of .85 and .74, respectively (for the sensitivity analyses, see online supplemental materials [p. ii]).[5]

Variables

Income Inequality. We again acquired the Gini coefficients for each country from the WIID. As indicated in the preregistration, we used the Gini coefficients of the same year as the PISA data collection; if they were not available, we used the next most recent estimates from either of the two preceding years (Study 2a: $M = .35 ± .08$; Study 2b: $M = .36 ± .08$).

Competitiveness and Cooperativeness Orientations. Our hypotheses were not only tested using domain-specific competitiveness

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[5] Given concerns regarding statistical power (Study 2b was slightly below the conventional 80% threshold), we preregistered that we might append the PISA 2000 data set to the PISA 2003 data set and use this appended data set in a single study (instead of running two separate studies). Using the appended data set to estimate the pooled within-data set effects of income inequality on competitiveness and cooperativeness led to the same conclusions as the main analyses (all $ps ≤ .023$).

Table 2

Studies 1 and 2a–2b: Standardized Coefficients and 95% CIs of the Multilevel Models Estimating the Effects (Highlighted in Bold) of Income Inequality on Perceived Competitiveness (Study 1) and Domain-Specific (Study 2a) or Domain-General (Study 2b) Competitiveness Orientation

Measure	Study 1 (PISA 2018)		Study 2a (PISA 2003)		Study 2b (PISA 2000)	
Number of students / schools / countries	490,106 / 20,630 / 75		259,070 / 9,907 / 38		77,391 / 5,440 / 32	
Without controls	β	95% CI	β	95% CI	β	95% CI
Gini coefficient – *G*	**.07****	**[.02, .13]**	**.17*****	**[.08, .26]**	**.12***	**[.02, .22]**
Student residual variance – var(e_{ijk})	.24	[.21, .29]	.28	[.22, .35]	.28	[.22, .36]
School residual variance – var(u_{0jk})	.19	[.19, .19]	.21	[.20, .21]	.18	[.16, .19]
Country residual variance – var(v_{00k})	.98	[.98, .98]	.98	[.98, .98]	.99	[.98, .99]
With controls	β	95% CI	β	95% CI	β	95% CI
Gini coefficient – *G*	**.08***	**[.01, .15]**	**.10***	**[.01, .20]**	**.16***	**[.01, .31]**
Age – *A*	.01***	[.01, .01]	−.01***	[−.02, −.01]	.00	[−.01, .00]
Sex (+0.5 = boys) – *S*	.04***	[.04, .05]	.12***	[.11, .12]	.05***	[.04, .05]
Origin (+0.5 = native) – *O*	.00	[.00, .01]	−.06***	[−.06, −.05]	−.02***	[−.03, −.01]
Social class background (+0.5 = high) – *SC*	.03***	[.03, .04]	.03***	[.02, .03]	.05***	[.04, .05]
National population – *PP*	−.02	[−.08, .04]	.05	[−.06, .15]	−.02	[−.11, .07]
GDP per capita (logs) – *GDP*	.02	[−.04, .09]	−.03	[−.16, .10]	−.19***	[−.31, −.08]
Unemployment rate – *U*	−.01	[−.08, .06]	.11	[−.01, .24]	−.09	[−.24, .06]
Poverty headcount ratio – *P*	.01	[−.05, .07]	−.05	[−.16, .05]	.02	[−.08, .12]
Expenditure on education – *E*	−.05	[−.11, .01]	−.03	[−.13, .07]	.05	[−.04, .14]
Country residual variance – var(v_{00k})	.24	[.20, .28]	.24	[.19, .31]	.21	[.16, .27]
School-level residual variance – var(u_{0jk})	.19	[.18, .19]	.19	[.19, .20]	.17	[.16, .18]
Student-level residual variance – var(e_{ijk})	.98	[.98, .98]	.97	[.97, .97]	.98	[.98, .99]

Note. The multilevel regression equation is $Y_{ijk} = B_{000} + B_{001} \times G_k [+B_{100} \times A_{ijk} + B_{200} \times S_{ijk} + B_{300} \times O_{ijk} + B_{400} \times SC_{ijk} + B_{002} \times PP_k + B_{003} \times GDP_k + B_{004} \times U_k + B_{005} \times P_k + B_{005} \times E_k +] e_{ijk} + u_{0jk} + v_{00k}$, $i = 1, 2, \ldots, N$ (participants), $j = 1, 2, \ldots, K$ (schools), $k = 1, 2, \ldots, L$ (countries); higher-class students have ≥ 1 college-educated parent(s); student-level variables were standardized by dividing the mean-centered variable by the average within-country *SD*; for country-level variables, we used the between-country *SD*. GDP = gross domestic product.
* $p < .05$. ** $p < .01$. *** $p < .001$.

and cooperativeness orientations (Study 2a), but also using domain-general orientations (Study 2b).

Domain-Specific. In Study 2a, we used PISA's four-item measures of *domain-specific* orientations toward competitiveness (e.g., "In Mathematics, I always try to do better than the other students in my class") and cooperativeness (e.g., "In Mathematics, I enjoy helping others to work well in a group"; response options ranged from 1 = *Strongly disagree* to 4 = *Strongly agree*). The PISA team adapted these measures from Owens and Barnes (1992) and described them as assessing "preferences for competitive learning situation" and "cooperative learning situation," respectively (OECD, 2004, p. 313). We averaged the four competitiveness items to obtain a measure of orientation toward competitiveness ($\bar{\alpha} = .82 \pm .03$, $M = 2.63 \pm .64$, ICC$_{country}$ = .10 [.06, .14], ICC$_{country|school}$ = .14 [.10, .18]) and the four cooperativeness items to obtain a measure of orientation toward cooperativeness ($\bar{\alpha} = .75 \pm .06$, $M = 2.85 \pm .72$, ICC$_{country}$ = .08 [.05, .13], ICC$_{country|school}$ = .11 [.08, .15]). The correlation between the two measures was $r = .32$, $p < .001$.

Domain-General. In Study 2b, we used PISA's five-item measures of *domain-general* orientations toward competitiveness (e.g., "I would like to be the best at something") and cooperativeness (e.g., "I like to help other people do well in a group"; response options ranged from 1 = *Disagree* to 4 = *Agree*). As in Study 2a, the PISA team adapted these measures from Owens and Barnes (1992) and again described them as assessing "preferences for competitive learning" and "cooperative learning," respectively (OECD, 2003; p. 137). We averaged the five competitiveness

items to obtain a measure of orientation toward competitiveness ($\bar{\alpha} = .76 \pm .05$, $M = 2.77 \pm .55$, ICC$_{country}$ = .06 [.04, .09], ICC$_{country|school}$ = .08 [.04, .09]) and the five cooperativeness items to obtain a measure of orientation toward cooperativeness ($\bar{\alpha} = .64 \pm .05$, $M = 2.94 \pm .63$, ICC$_{country}$ = .09 [.06, .14], ICC$_{country|school}$ = .12 [.09, .17]). The correlation between the two measures was $r = .25$, $p < .001$.

Results

Overview of Analyses

We again treated students (level-1 units) as nested in schools (level-2 units) and countries (level-3 units). For each study, we regressed each outcome (competitiveness or cooperativeness orientation) on income inequality while excluding or including the same preregistered set of control variables used in Study 1 and while again using MICE with 10 imputed data sets to account for missing values on the control variables. Tables 2 and 3 present the full results and regression equation for the main analysis.

Main Preregistered Analyses

In Study 2a, consistent with Hypothesis 2A, the higher the income inequality, the higher the domain-specific competitiveness orientation, $\beta = .17$ [.08, .26], $p < .001$, and $\beta_c = .10$ [.01, .20], $p_c = .032$. In Study 2b, replicating this finding, the higher the income inequality, the higher the domain-general competitiveness orientation, $\beta = .12$ [.02, .22], $p = .015$, and $\beta_c = .16$ [.01, .31],

Table 3

Studies 1 and 2a–2b: Standardized Coefficients and 95% CIs of the Multilevel Models Estimating the Effects (Highlighted in Bold) of Income Inequality on Perceived Cooperativeness (Study 1) and Domain-Specific (Study 2a) or Domain-General (Study 2b) Cooperativeness Orientation

Measure	Study 1 (PISA 2018)		Study 2a (PISA 2003)		Study 2b (PISA 2000)	
Number of students / schools / countries	475,234 / 20,566 / 75		258,469 / 9,907 / 38		77,452 / 5,440 / 32	
Without controls	β	95% CI	β	95% CI	β	95% CI
Gini coefficient – *G*	**−.04**[†]	**[−.09, .01]**	**.12*****	**[.05, .2]**	**.12***	**[.02, .22]**
Country residual variance – $\text{var}(v_{00k})$	.21	[.18, .24]	.22	[.18, .28]	.28	[.22, .36]
School-level residual variance – $\text{var}(u_{0jk})$	.22	[.22, .23]	.16	[.15, .17]	.18	[.16, .19]
Student-level residual variance – $\text{var}(e_{ijk})$	.98	[.97, .98]	.99	[.98, .99]	.99	[.98, .99]
With controls	β	95% CI	β	95% CI	β	95% CI
Gini coefficient – *G*	**−.07****	**[−.13, −.02]**	**.09***	**[.01, .18]**	**.19***	**[.002, .38]**
Age – *A*	.00	[.00, .00]	−.004*	[−.01, −.0,004]	.01*	[.009, .02]
Sex (+0.5 = boys) – *S*	.004*	[.001, .01]	−.02***	[−.02, −.01]	−.12***	[−.13, −.11]
Origin (+0.5 = native) – *O*	.01***	[.004, .01]	−.03***	[−.03, −.02]	.01**	[.002, .02]
Social class background (+0.5 = high) – *SC*	.02***	[.01, .02]	.00	[−.01, .00]	.01[†]	[.0003, .01]
National population – *PP*	.02	[−.03, .07]	−.02	[−.11, .07]	.00	[−.11, .11]
GDP per capita (logs) – *GDP*	−.01	[−.07, .04]	−.04	[−.15, .08]	−.06	[−.20, .09]
Unemployment rate – *U*	.04	[−.02, .10]	.02	[−.09, .13]	−.08	[−.27, .11]
Poverty headcount ratio – *P*	−.02	[−.07, .03]	.01	[−.08, .10]	−.01	[−.14, .11]
Expenditure on education – *E*	−.03	[−.08, .02]	−.03	[−.12, .05]	.13*	[.02, .25]
Country residual variance – $\text{var}(v_{00k})$	.20	[.17, .24]	.27	[.21, .34]	.27	[.21, .34]
School-level residual variance – $\text{var}(u_{0jk})$	.22	[.22, .22]	.18	[.17, .20]	.18	[.17, .20]
Student-level residual variance – $\text{var}(e_{ijk})$	.98	[.97, .98]	.98	[.97, .98]	.98	[.97, .98]

Note. The multilevel regression equation is $Y_{ijk} = B_{000} + B_{001} \times G_k$ [$+ B_{100} \times A_{ijk} + B_{200} \times S_{ijk} + B_{300} \times O_{ijk} + B_{400} \times SC_{ijk} + B_{002} \times PP_k + B_{003} \times GDP_k + B_{004} \times U_k + B_{005} \times P_k + B_{005} \times E_k$] $+ e_{ijk} + u_{0jk} + v_{00k}$, $i = 1, 2, \ldots, N$ (participants), $j = 1, 2, \ldots, K$ (schools), $k = 1, 2, \ldots, L$ (countries); higher-class students have ≥ 1 college-educated parent(s); student-level variables were standardized by dividing the mean-centered variable by the average within-country *SD*; for country-level variables, we used the between-country *SD*. GDP = gross domestic product.
[†] $p < .10$.   * $p < .05$.   ** $p < .01$.   *** $p < .001$.

$p_c = .033$ (for a graphical representation of the findings, see Figure 2). However, in Study 2a, inconsistent with Hypothesis 2B, the higher the income inequality, the *higher* the domain-specific cooperativeness orientation, β = .12 [.05, .20], $p < .001$, and β$_c$ = .09 [.01, .18], p_c = .024. In Study 2b, replicating this surprising finding, the higher the income inequality, the *higher* the domain-general cooperativeness orientation, β = .12 [.02, .23], p = .024, and β$_c$ = .19 [.002, .38], p_c = .048.

Additional Nonpreregistered Analyses

When reflecting upon the surprising positive association between income inequality and cooperativeness orientation, we realized that the cooperativeness measures used in PISA contain items that seem to focus on two distinguishable constructs. On the one hand, two items appear to measure an orientation toward *instrumental* cooperativeness, that is, the benefits (e.g., in terms of achievement) of cooperating ("I do my best work in Mathematics when I work with other students"; "I learn most when I work with other students"). On the other hand, two other items appear to measure an orientation toward *intrinsic* cooperativeness, that is, the pleasure of cooperating ("In mathematics, I enjoy helping others to work well in a group"; "I like to help other people do well in a group").

In education, it is widely known that academic behaviors and orientations can be located on a continuum, with instrumental (external) reasons at one extreme (e.g., studying because of external contingencies such as grades) and intrinsic reasons at the other extreme (e.g., studying because of an inherent enjoyment in

the task; see Ryan & Deci, 2020). Various academic behaviors and orientations have been found to be undergirded by instrumental or intrinsic reasons: engagement in homework (Adeli et al., 2020), active participation in class (Katz et al., 2011), recreational and academic reading (De Naeghel et al., 2012), the daily pursuit of personal educational goals (Ketonen et al., 2018), and an orientation toward task-mastery and self-improvement (Sommet & Elliot, 2017). However, the idea that one's orientation toward cooperativeness could also be undergirded by intrinsic or instrumental reasons has yet to be explored.

In economics, it is also widely known that economic agents in the marketplace may sometimes cooperate for instrumental rather than intrinsic reasons, forming strategic alliances with competitors to gain a cooperation-based competitive advantage (Bouncken et al., 2015; for public good experiments distinguishing between altruistic and strategic motives for cooperation, see Burton-Chellew et al., 2017; Yamakawa et al., 2016). In a competitive market, this tactic of cooperating with rivals to create value while also competing against them to capture part of this value is known as *coopetition* (Köseoğlu et al., 2019). Although the coopetition framework has not previously been used in education research, it is possible that high-inequality contexts foster cooperative behaviors at school driven by strategic concerns to succeed academically (instrumental cooperativeness), rather than by the sole satisfaction that may result from helping others (intrinsic cooperativeness).

From this post hoc reasoning, we derived a revised version of Hypothesis 2B, namely, Hypothesis 2B′: Income inequality

Figure 1

Study 1: Associations Between Income Inequality and Perceived Competitiveness (Left Panel) and Perceived Cooperativeness (Right Panel)
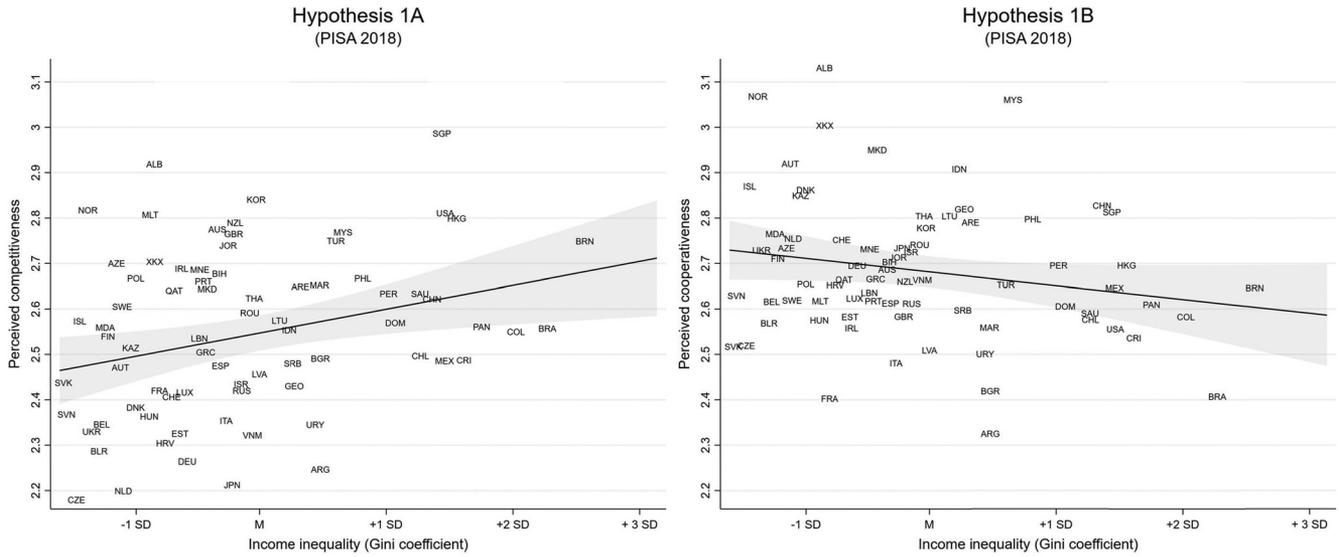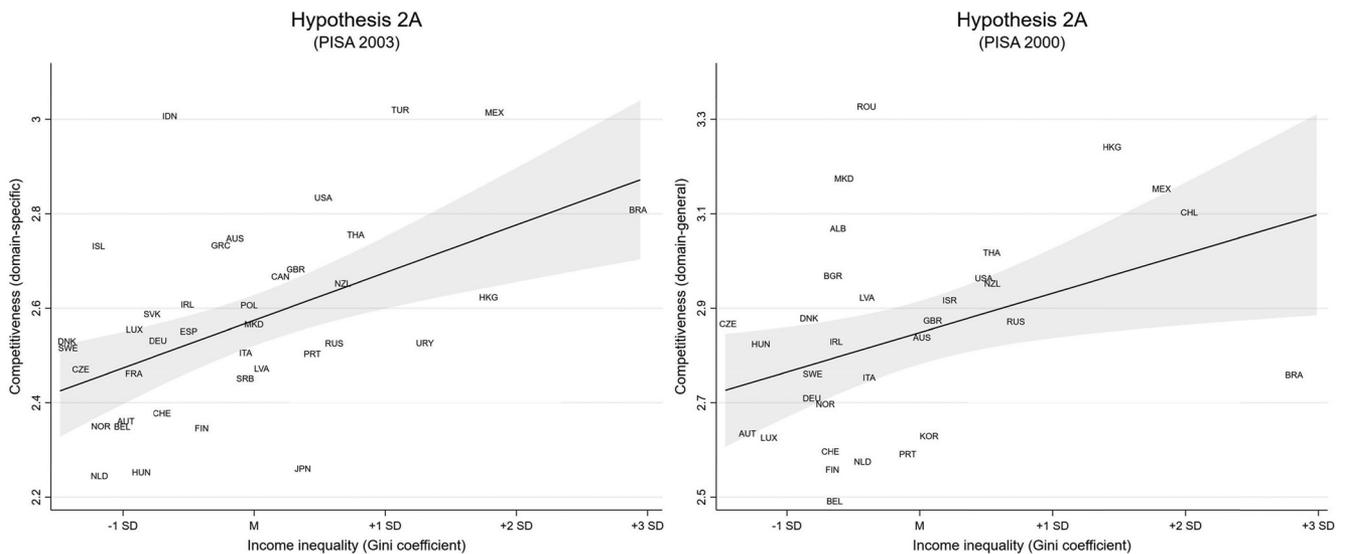

Note. The regression lines were derived from the models without control variables; the estimates from the models with control variables are very similar. The national averages of the outcome variable are indicated by the position of their ISO 3166-1 alpha-3 codes; gray areas represent 95% confidence intervals.

is a stronger predictor of instrumental cooperativeness than intrinsic cooperativeness (a between-within interaction hypothesis). To test this new, nonpreregistered prediction, we first conducted confirmatory factor analyses (CFAs) testing whether instrumental and intrinsic cooperativeness items loaded on different factors; second, we conducted multilevel analyses testing the interaction between income inequality and type of cooperativeness.

CFAs Differentiating Instrumental From Intrinsic Cooperativeness. We ran a series of CFAs on the items of the PISA 2003 and 2000 cooperativeness scales. For each country of each study, we compared (a) a model in which the *instrumental* cooperativeness items were differentiated from the *intrinsic* cooperativeness items (a two-factor model) with (b) a baseline model in which all items were represented by a single cooperativeness factor (a one-factor model).

Figure 2

Studies 2a and 2b: Associations Between Income Inequality and Domain-Specific Competitiveness Orientation (Left Panel) and Domain-General Competitiveness Orientation (Right Panel)

Note. The regression lines were derived from the models without control variables; the estimates from the models with control variables are very similar. The national averages of the outcome variable are indicated by the position of their ISO 3166-1 alpha-3 codes; gray areas represent 95% confidence intervals.

The two-factor model was found to fit the data better than the one-factor model in 95% of the countries of Study 2a and 97% of the countries of Study 2b (for the country-specific chi-square difference tests, see Table S2). The overall weighted average chi-square difference test was $\chi^2 = 368.13$, $p < .001$ in Study 2a and $\chi^2 = 45.31$, $p < .001$ in Study 2b (for graphical representations with the wordings of all items, see Figure S1). This shows that instrumental and intrinsic cooperativeness are operationally distinct.

Multilevel Models Differentiating the Effect of Income Inequality on Instrumental and Intrinsic Cooperativeness. Second, we built the same three-level multilevel models used in the main analyses, using the difference between instrumental cooperativeness and intrinsic cooperativeness as the outcome (note that using such a difference score in a regression framework is mathematically equivalent to testing type of cooperativeness as a within-participant variable in an ANOVA framework; for the description of the outcome variables, descriptive statistics, and correlations, see online supplemental materials [p. vii]).

Table S3 presents the full results and the regression equation. In Study 2a, consistent with the new Hypothesis 2B′, the higher the income inequality, the more students favored domain-specific instrumental cooperativeness over domain-specific intrinsic cooperativeness, $\beta = .10$ [0.06, 0.15], $p < .001$, and $\beta_c = 0.12$ [0.06, 0.17], $p_c < .001$. In Study 2b, replicating this finding, the higher the income inequality, the more students favored domain-general instrumental cooperativeness over domain-general intrinsic cooperativeness, $\beta = .08$ [0.05, 0.14], $p < .001$, and $\beta_c = 0.17$ [0.08, 0.24], $p_c < .001$ (for a graphical representation of the findings, see Figure 3). This suggests that students from unequal countries may use cooperation as a strategy to improve their achievement rather than enjoying cooperation for its own sake.

Discussion

In Studies 2a and 2b, we showed that income inequality is associated with a stronger orientation toward both competitiveness (consistent with preregistered Hypothesis 2A) and cooperativeness (inconsistent with preregistered Hypothesis 2B). In follow-up analyses, we then showed that income inequality is associated with a preference toward instrumental rather than intrinsic cooperativeness (consistent with nonpreregistered Hypothesis 2B′),

Together with Study 1, Studies 2a and 2b used large-scale cross-national data sets to document robust associations between income inequality and competitiveness/cooperativeness. However, these studies were limited in two important ways: (a) they used observational data that did not enable us to test causality, and (b) the link between income inequality and instrumental/intrinsic cooperativeness was documented in a post hoc analysis. In Study 3, we aimed to replicate the findings from the PISA studies while manipulating income inequality. Specifically, we adapted the "Bimboola paradigm" (Jetten et al., 2015), asking participants to imagine going back to school in a society with either high income inequality or low income inequality. This experimental paradigm has been used by multiple research teams (e.g., Cheng et al., 2021; del Fresno-Díaz et al., 2021; Peters et al., 2021), demonstrating that participants are able to immerse themselves in the context of an unequal or equal society. Furthermore, we focused on young respondents (between 18 and 29), to ensure that participants could easily project themselves into the role of student.

Study 3: The Bimboola Experiment

In Study 3, we aimed to test the following preregistered hypotheses: "Perceived competitiveness is higher in the high-inequality condition than in the low-inequality condition [Hypothesis 1A],"

Figure 3

Studies 2a and 2b: Associations Between Income Inequality and Domain-Specific (Left Panel) and Domain-General (Right Panel) Instrumental Versus Intrinsic Cooperativeness
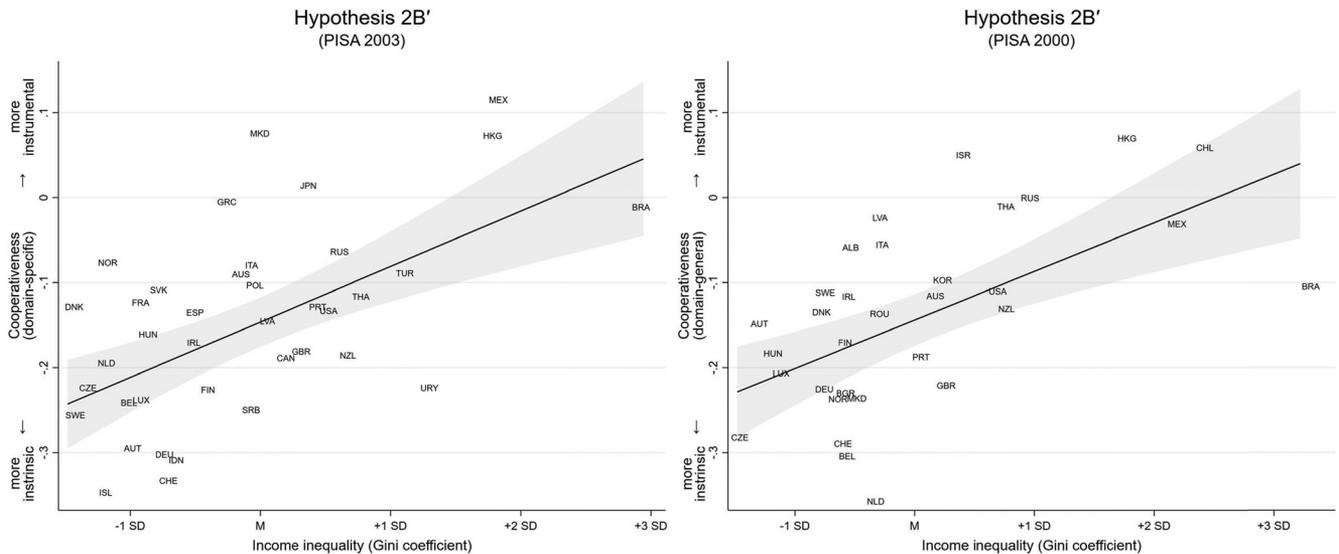
Note. The regression lines were derived from the models without control variables; the estimates from the models with control variables are very similar. The national averages of the outcome variable are indicated by the position of their ISO 3166-1 alpha-3 codes; gray areas represent 95% confidence intervals.

"Perceived cooperativeness is lower in the high-inequality condition than in the low-inequality condition [Hypothesis 1B]," "Orientation toward competitiveness is higher in the high-inequality condition than in the low-inequality condition [Hypothesis 2A]," and "Orientation toward instrumental cooperativeness is higher than orientation toward intrinsic cooperativeness in the high-inequality condition; this difference is attenuated in the low-inequality condition [Hypothesis 2B′]" (see "Preregistration (The Bimboola Experiment).pdf" on https://osf.io/mz3tn/).

Method

A Priori Power Analysis

An a priori preregistered power analysis revealed that 771 participants were needed to detect four small-sized effects of the manipulation of income inequality with a power of .90 (for the power analysis, see online supplemental materials [p. xii]). We oversampled by 10% and opened our experiment to 850 participants to account for the exclusion of missing data.

Participants

We used CloudResearch's MTurk Toolkit to recruit participants across the U.S. over the course of several weeks (they received USD 1.00 for participating). We targeted participants 18 to 29 years old to maximize relevance (in the experiment, participants are asked to imagine that they go back to school). As in Studies 1 and 2, we retained all participants with nonmissing values for any of the outcome variables (98.25% of participants). Moreover, nine participants above 29 years old were incorrectly screened by CloudResearch and were removed from the sample before analyses. The final sample comprised 846 young adults (M_{age} = 24.46 ±2.62; 42.25% men; 69.47% White; 51.60% 4-year college degree or higher; median equivalized [i.e., household-size adjusted] annual income = USD 33,750).

Procedure

The procedure of the experiment was adapted from the "Bimboola paradigm" (Blake & Brooks, 2019; Wang et al., 2020). Participants were told that they and their family would become citizens of a fictional society called "Bimboola." They were told that their plan was to go back to school in Bimboola, learn a new skill set, and retrain for a new job. To help participants picture themselves returning to school in this new society, they were given the following open-ended question: "In your own words, please describe the plans for your new life in Bimboola."

Manipulation of Income Inequality

Participants were randomly assigned to one of two conditions. In *the low-inequality condition* (n = 420), participants were told that the top 20% in Bimboola earns 60,000 Bimboolean Dollars (BD) per year, the middle 20% earns 50,000 BD, and the bottom 20% earns 40,000 BD (a 1.5-factor difference between the top and bottom 20%). In *the high-inequality condition* (n = 426), participants were told that the top 20% in Bimboola earns 423,000 BD per year, the middle 20% earns 50,000 BD, and the bottom 20% earns 12,000 BD (a 35-factor difference between the top and bottom 20%). In both conditions, participants were assigned to the middle-income group (earning 50,000 BD). Participants were required to report the correct income gap between the top and bottom 20% to move on to the next page.

Then, participants were told that to begin their new life in Bimboola as a student, they needed to purchase: (a) a house to live in and study, (b) a car to get to and from school, and (c) a holiday to take a break from their courses. For each of these, participants saw pictures of three items that could only be afforded by the top 20%, three items that could also be afforded by the middle 20%, and three items that could also be afforded by the bottom 20%. In the *low-inequality condition*, the differences between the first and last three items were small (e.g., mid/low- vs. mid/high-priced houses), whereas in *the high-inequality condition*, the differences were large (e.g., very low– vs. very high–priced houses). In both conditions, the three middle pictures were identical (see the materials in the OSF page of the project). At the end of the task, a manipulation strengthener repeated the key information about income distribution and purchasing power inequality.

Variables

Following the manipulation, participants were told that they were now in their freshman year at the Bimboolean school. They were told that, as time goes by, they would "learn about the curriculum," "get to know the other students," and "get accustomed to the atmosphere in [their] Bimboolean school." At this point, participants completed our measures. Table S4 presents the correlations between the focal variables.

Perceived Inequality. We adapted Sommet at al.'s (2019) four-item perceived inequality scale (response options ranged from 1 = *Strongly disagree* to 7 = *Strongly agree*). We average the items and used this variable as a manipulation check ("In Bimboola, there is a huge gap between rich and poor families"; α = .98, M = 4.80 ±2.19).

Perceived Competitiveness and Cooperativeness. We used the same measures used in Study 1. Specifically, we adapted the PISA 2018 (originally from Murayama & Elliot, 2012) four-item measures of perceived competitiveness and cooperativeness (response options ranged from 1 = *Extremely unlikely*, 7 = *Extremely likely*). We averaged the items to obtain measures of perceived competitiveness (e.g., "Bimboolean students compete with each other"; α = .93, M = 4.86 ±1.30) and perceived cooperativeness (e.g., "Bimboolean students cooperate with each other"; α = .95, M = 4.87 ±1.27).

Competitiveness and Cooperativeness Orientation.

Competitiveness Orientation. We used the same measure used in Studies 2a and 2b. Specifically, we adapted PISA 2000s (originally from Owens & Barnes, 1992) five-item assessment of *domain-general* orientation toward competitiveness (response options ranged from 1 = *Strongly disagree*, 7 = *Strongly agree*). We averaged the items to obtain measures of competitiveness orientation (e.g., "[Now that I am in the first year of Bimboolean school] I try to do better than the other Bimboolean students"; α = .92, M = 5.34 ±1.22).

Instrumental Versus Intrinsic Cooperativeness. We adapted Xiong et al.'s (2015) motivation for collaborative learning scale (response options ranged from 1 = *Strongly disagree* to 7 = *Strongly agree*). Participants were asked about the "possible reasons [they] might like to collaborate with other Bimboolean students." Four

items measured *instrumental cooperativeness* (e.g., "Because collaborating with Bimboolean classmates can help me to achieve academic success"; α = .83, M = 4.98 ±1.34) and four items measured *intrinsic cooperativeness* (e.g., "Because collaborating is fun"; α = .91, M = 5.40 ±1.06). The two series of items were counterbalanced (instrumental cooperativeness first: n = 420; intrinsic cooperativeness first: n = 425). As indicated in the preregistration, and as in Studies 2a-2b, we used the difference between instrumental cooperativeness and intrinsic cooperativeness to test the between-within interaction Hypothesis 2B′ (M = .43 ±1.13).

Results

Overview of Analyses

For the manipulation check and each hypothesis, we regressed the outcome on the condition ($-.5$ = low-inequality condition, $+.5$ = high-inequality condition) while excluding or including a preregistered set of five control variables (age, sex, race, education, and equivalized income). For Hypothesis 2B′, we entered the order of presentation of the instrumental and intrinsic cooperativeness variables as an additional control variable. Table 4 presents the full results and the regression equation, and Figure 4 presents a graphical representation of the findings.

Preregistered Analyses

Manipulation Check. Perceived inequality was higher in the high-inequality condition than in the low-inequality condition, β = .84 [.80, .87], $p < .001$, and $β_c$ = .85 [.81, .88], $p_c < .001$. This indicates that the manipulation was effective.

Perceived Competitiveness. Consistent with Hypothesis 1A, and conceptually replicating Study 1, perceived competitiveness was higher in the high-inequality condition than in the low-inequality condition, β = .54 [.49, .60], $p < .001$, and $β_c$ = .54 [.48, .60], $p_c < .001$.

Perceived Cooperativeness. Consistent with Hypothesis 1B, and conceptually replicating Study 1, perceived cooperativeness was lower in the high-inequality condition than in the low-inequality condition, β = $-.50$ [$-.55$, $-.44$], $p < .001$, and $β_c$ = $-.50$ [$-.56$, $-.44$], $p_c < .001$.

Competitiveness Orientation. Consistent with Hypothesis 2A, and conceptually replicating Studies 2a and 2b, competitiveness orientation was higher in the high-inequality condition than in the low-inequality condition, β = .24 [.17, .31], $p < .001$, and $β_c$ = .24 [.17, .30], $p_c < .001$.

Instrumental Versus Intrinsic Cooperativeness. Consistent with Hypothesis 2B′, and conceptually replicating Studies 2a and 2b, instrumental (vs. intrinsic) cooperativeness was favored more in the high-inequality condition than in the low-inequality condition, β = .13 [.07, .20], $p < .001$, and β = .13 [.06, .19], $p < .001$. Specifically, instrumental cooperativeness was higher than intrinsic cooperativeness in the high-inequality condition, whereas this difference was attenuated in the low-inequality condition.

Discussion

In Study 3, we showed that induced income inequality (a) increases perceived competitiveness (consistent with preregistered Hypothesis 1A), (b) decreases perceived cooperativeness (consistent with preregistered Hypothesis 1B), (c) prompts an orientation toward competitiveness (consistent with preregistered Hypothesis 2A), and (d) prompts an orientation toward instrumental rather than intrinsic cooperativeness (consistent with preregistered Hypothesis 2B′).

General Discussion

Income inequality has long been argued to nurture a culture of upward comparison, in which economic agents compete more fiercely against one another for positional goods, lavish lifestyles, and enviable status (Schor, 1998). In this research, we sought to determine whether income inequality fosters an ethos of competitiveness and inhibits cooperativeness among *future* economic agents, shaping how students experience competitiveness and cooperativeness at school.

Contributions

Income Inequality, Perceived Competitiveness, and Orientation Toward Competitiveness

Regarding competitiveness, our observational and experimental evidence show that income inequality is positively associated with both the perception that one's schoolmates are competitive and an orientation toward competitiveness. These findings may be interpreted as follows: When the share of national income received by top earners is larger, the structural incentive to beat the academic competition to reach top-earning positions is higher; that is, income inequality turns school into a breeding ground for competitiveness.

The mechanisms accounting for the association between income inequality and competitiveness might be located at the cultural (e.g., power distance), institutional (e.g., school policies), or interpersonal (e.g., peer influence) level (see Basabe & Ros, 2005; Marks, 2009; Weiss & Stuntz, 2004, respectively). However, we believe that parental caregivers and school staff are among the chief agents of socialization who recognize the particular importance of students' future positions in stratified society, and put greater pressure on them to successfully navigate the filters of academic selection (for research on income inequality and intensive parenting, see Agostinelli et al., 2020, for research on the role of parental ambition and school principals' values in shaping children's competitiveness, see Berson & Oreg, 2016; Khadjavi & Nicklisch, 2018; respectively). In the school context, it is at least plausible that teachers are one of the main facilitators of students' perceiving that school is a competitive arena, and are a driving force emphasizing the importance of competitive values. Indeed, higher levels of national income inequality are associated with higher beliefs in meritocracy (Mijs, 2021), and this kind of belief has been found to influence teachers' practices and students' competitiveness (Autin et al., 2015; Khamzina et al., 2021; Sommet et al., 2017). This echoes the words of Deutsch (1979) when he wrote "schools serve as a socializing influence on children to accept the dominant values within their society" (p. 393). However, our experiment also documents that the *mere* perception of societal income inequality (without provocation by an external agent) is enough to prompt perceived competitiveness and an

Table 4

Study 3: Standardized Coefficients and 95% CIs of the Regression Models Estimating the Effects (Highlighted in Bold) of the Manipulation of Income Inequality on Perceived Competitiveness, Perceived Cooperativeness, Competitiveness Orientation, and Instrumental Versus Intrinsic Cooperativeness

Measure	Perceived competitiveness		Perceived cooperativeness		Competitiveness orientation		Instrumental versus intrinsic cooperativeness	
Number of participants	846	834	846	834	845	834	845	834
Without controls	β	95% CI	β	95% CI	β	95% CI	β	95% CI
Income inequality – I	**0.54*****	**[0.49, 0.60]**	**−0.50*****	**[−0.55, −0.44]**	**0.24*****	**[0.17, 0.31]**	**0.13*****	**[0.07, 0.20]**
With control variables	β	95% CI	β	95% CI	β	95% CI	β	95% CI
Income inequality – I	**0.54*****	**[0.48, 0.60]**	**−0.50*****	**[−0.56, −0.44]**	**0.24*****	**[0.17, 0.30]**	**0.13*****	**[0.06, 0.19]**
Age—A	0.04	[−0.02, 0.10]	0.02	[−0.05, 0.08]	0.03	[−0.04, 0.10]	0.03	[−0.04, 0.10]
Sex (+0.5 = boys) – S	0.05	[−0.00, 0.11]	0.00	[−0.06, 0.06]	0.03	[−0.04, 0.10]	0.02	[−0.05, 0.08]
Origin (+0.5 = native) – O	−0.02	[−0.08, 0.04]	−0.02	[−0.08, 0.04]	−0.10**	[−0.16, −0.03]	−0.02	[−0.08, 0.05]
Education (+0.5 = high) – Ed	0.02	[−0.05, 0.08]	0.03	[−0.03, 0.09]	0.04	[−0.03, 0.11]	0.01	[−0.06, 0.09]
Equivalized annual income – Eq	−0.05	[−0.11, 0.01]	0.03	[−0.03, 0.09]	0.05	[−0.01, 0.12]	0.02	[−0.05, 0.09]
Order of the scales – O							0.10**	[0.04, 0.17]

Note. The regression equation is $Y_j = B_0 + B_1 \times I_i [+ B_1 \times A_i + B_2 \times S_i + B_3 \times O_i + B_4 \times Ed_i + B_5 \times Eq_i + B_6 \times O_i] + e_i$, $i = 1, 2, \ldots, N$ (participants); higher-educated participants hold a 4-year college degree; equivalized (household-size adjusted) annual income was computed by dividing household income by the square root of household size (OECD, 2019c); variations in *N*s are due to missing values.
** $p < .01$. *** $p < .001$.

orientation toward competitiveness (for additional relevant qualitative evidence, see Kim & Gewirtz, 2019).

Income Inequality, Perceived Cooperativeness, and Orientation Toward Cooperativeness

Regarding cooperativeness, our results point to a paradox: Income inequality is positively associated with the perception that one's schoolmates are uncooperative (congruent with the

above), but it is also positively associated with an orientation toward cooperativeness (seemingly incongruent with the above). Additional evidence resolved this paradox, showing that income inequality is associated with an orientation toward instrumental rather than intrinsic cooperativeness (whereby collaboration is used as a strategic tool to achieve academic success rather than for the inherent enjoyment of the cooperation itself).

Figure 4

Study 3: Effect Income Inequality Manipulation (Low Versus High Inequality) on Perceived Competitiveness (Left Panel), Perceived Cooperativeness (Middle-Left Panel), Competitiveness Orientation (Middle-Right Panel), and Instrumental Versus Intrinsic Cooperativeness (Right Panel)
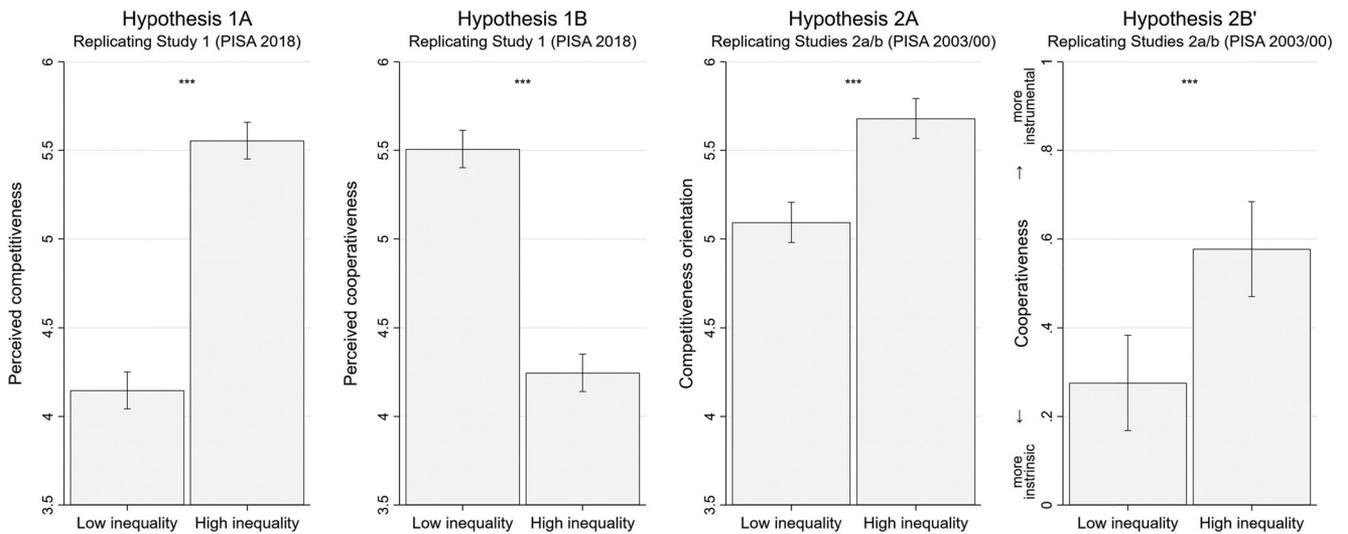
Note. The estimates are from the models without control variables; the estimates from the models with control variables are very similar. Error bars represent 95% confidence intervals.
*** $p < .001$.

We believe that these findings can be understood through the lens of the concept of coopetition (Bouncken et al., 2015). In free market economies, firms sometimes forge strategic alliances (e.g., cooperating in activities such as R&D) while simultaneously competing against one another (e.g., for sales); these coopetitive relationships enable firms to innovate, reduce risk, and share costs to get an edge on their (nonparticipating) competitors. In contexts with high income inequality, students may also come to forge strategic alliances (e.g., cooperating in activities such as homework) while simultaneously competing against each other (e.g., for grades); these coopetitive relationships could enable them to acquire more helpful information, tackle more complex ideas, and learn more to gain an edge in academic selection processes (we believe that the mechanisms accounting for the association between income inequality and coopetitiveness are of the same nature as the mechanisms accounting for the association between income inequality and competitiveness discussed above). These findings are also consistent with a self-determination theory perspective, which differentiates between instrumentally grounded goals (e.g., controlled academic and nonacademic goals) and intrinsically grounded goals (e.g., autonomous academic and nonacademic goals; Acee et al., 2012). However, given that instrumentally grounded goals are associated with lower enthusiasm and commitment (Ryan & Deci, 2020; Sommet & Elliot, 2017; Vansteenkiste et al., 2010), it is reasonable to question whether an orientation toward instrumental cooperativeness could result in satisfactory and long-lasting cooperation between students over time.

Limitations

Three limitations of our research should be acknowledged.

Effect Sizes

The median estimate from the one-predictor models across our observational studies is $\bar{\beta} = .10$ (βs from one-predictor multilevel models can *roughly* be interpreted as rs). Although this median effect is small, two considerations should be borne in mind. First, statistically small effects can have societally important consequences when they apply repeatedly to many people (Greenwald et al., 2015). We believe this is the case here: The historical rise in income inequality observed in the last 25 years ($^3/_4$ of the world population live in countries where inequality has grown; United Nations, 2020) may have exerted a continuous impact on the hundreds of millions of students enrolled in secondary school (World Bank, 2020). Second, statistically small effects could also be due to complex indirect mechanisms involved in the effect (Matthay et al., 2021). We believe that this is the case here: As alluded to above, agents of socialization such as teachers might represent one of the pathways through which income inequality affects students' orientations; but not all teachers from unequal societies will encourage students to be more competitive (e.g., due to ideological reluctance or reactance to the general cultural emphasis), thereby weakening the overall effect. As a matter of fact, the median estimate from the one-predictor model in our experiment (that isolated the effect of income inequality at the price of ecological validity) is nearly four times larger ($\bar{\beta} = .37$) than that observed in our observational studies.

Causality Inferences

The cross-sectional design used in our observational studies does not allow us to draw causal inferences. In particular, it is possible that societies that are more competitive (or less intrinsically cooperative) tend to move toward greater income inequality, rather than the opposite. While this reverse causality-based account cannot be formally ruled out, we believe it has two weaknesses: (a) it lacks explanatory depth, and (b) it is at odds with available experimental evidence. First, a reverse causality-based account leaves open the question of why there would be cultural differences in the first place (why are some societies more competitive than others? Why are others more intrinsically cooperative?), whereas the idea that income inequality—a macroeconomic predictor—impacts cultural values and norms via school institutions seems to have more explanatory depth. Second, a reverse causality-based account is not consistent with extant experimental evidence documenting that induced income inequality increases competitiveness in the economic environment (e.g., Cheng et al., 2021; Melita et al., 2021; Sommet et al., 2019) and with Study 3, which documents similar effects in the academic environment.

Cultural Variation

Our observational studies *mainly* used data from developed countries (though the PISA studies also include LMICs [low- and middle-income countries] such as Kazakhstan, the Philippines, and Morocco), and our experimental study used a U.S. sample. The psychological costs of national income inequality are known to depend on the level of economic development (Ngamaba et al., 2018) and the effects of experimental manipulations may vary (albeit marginally) from one culture to another (Klein et al., 2018). Thus, future research and experimental replication using data from LMICs and/or non-WEIRD (Western educated industrialized rich democracies) countries (Henrich, 2020) are needed to test the generalizability of our findings.

Future Research Directions

Investigating the Downstream Consequences of Competitiveness and Cooperativeness

In the present research, we did not investigate the downstream consequences of competitiveness and cooperativeness. Traditionally, competitiveness has been perceived as primarily undesirable, whereas cooperativeness has been perceived as primarily desirable (for examples of classical work, see Deutsch, 1949; Kohn, 1992; Mead, 1937). However, studies from the 1990s demonstrated that competitive contexts could sometimes be neutral or even beneficial for achievement outcomes (e.g., see Epstein & Harackiewicz, 1992; Stanne et al., 1999; Tauer & Harackiewicz, 1999). Recent advances in the study of cooperative learning, on the other hand, confirmed that cooperative contexts are overall beneficial for achievement outcomes (Kyndt et al., 2013), although these benefits might be thwarted by competition (for a review, see Butera & Buchs, 2019). Below, we briefly discuss the state of the art of research on the downstream implications of

competitiveness and cooperativeness, and formulate future research questions.

Competitiveness. There is evidence in the literature that competitiveness may exert opposing effects on achievement outcomes. Perceiving or being oriented toward competitiveness can be appraised as a threat (e.g., for students low in self-efficacy), and prompts avoidance-based goals (e.g., not falling behind the competition), which may result in negative experiential or achievement-related consequences. Conversely, perceiving or being oriented toward competitiveness can be appraised as a challenge (e.g., for students high in self-efficacy), and prompts approach-based goals (e.g., getting ahead of the competition), which may result in positive experiential or achievement-related consequences (for a review, see Elliot, 2020). Future research questions include: Does income inequality exert opposing effects on educational outcomes via competitiveness (e.g., motivation, performance)? Does income inequality widen the gap between the students who suffer from competition and those who benefit from competition?

Cooperativeness. There is evidence in the literature that cooperativeness exerts beneficial effects on achievement outcomes. Cooperative learning methods have repeatedly been found to be beneficial for interpersonal (e.g., peer relationship) and intrapersonal (e.g., learning) outcomes (Roseth et al., 2008), although the magnitude of the benefits varies from one cultural context to another (Zeneli et al., 2016). To be effective, cooperative learning methods should follow a set of principles, with the first principle being sharing a common goal (Johnson & Johnson, 2009). As such, cooperative methods tend to lose their benefits when they activate social comparison concerns or negatively interdependent goals (e.g., see Buchs et al., 2021; Roseth et al., 2019). Future research questions include: Does income inequality undermine the positive interpersonal and/or intrapersonal effects of cooperative learning by increasing perceptions of or orientation toward competitiveness? Does income inequality account for the variation in the magnitude of the effect of cooperative learning from one country to another?

Taking the Multifaceted Nature of Competitiveness Into Account

In the present research, we conceptualized perceived competitiveness and orientation toward competitiveness as omnibus constructs. Over the past decades, scholars have attempted to break down general competitiveness into its subcomponents (for a review, see Fülöp & Orosz, 2015). In doing so, they distinguished between two main forms of competitiveness: hypercompetitiveness and self-developmental competitiveness (for early work, see Horney, 1937/2013; for contemporary work, see Houston et al., 2002; Newby & Klein, 2014; Orosz et al., 2018).[6] On the one hand, *hypercompetitiveness* is an excessive and hostile form of competitiveness. Hypercompetitive individuals see competition as a zero-sum game where rivals need to be vanquished; they are driven by an indiscriminate desire to win and assert their superiority over others (Ryckman et al., 1990). On the other hand, *self-developmental competitiveness* is an experiential and epistemic form of competitiveness. Self-developmental competitive individuals see competition as an opportunity for learning and self-discovery; they are driven by the

competitive process (enjoying the task and improving) rather than the competitive outcome (defeating others; Ryckman et al., 1996).

Hypercompetitiveness and self-developmental competitiveness are usually seen as destructive and constructive forms of competitiveness, respectively (see Fülöp & Orosz, 2015). For instance, hypercompetitiveness is associated with a host of antisocial outcomes, such as selfishness, unforgiveness, aggressiveness, procheating attitudes, and deceptive behaviors, whereas self-developmental competitiveness has benign or positive social consequences (Collier et al., 2010; Hibbard & Buhrmester, 2010; Mudrack et al., 2012; Orosz et al., 2013; Ryckman et al., 1997; Tassi & Schneider, 1997; Thornton et al., 2009). Moreover, there is evidence that hypercompetitiveness is not predictive (or is poorly predictive) of academic achievement, whereas self-developmental competitiveness is linked with both resilience (i.e., the ability to thrive in the face of adversity) and academic achievement (Bing, 1999; Orosz et al., 2018; Thornton et al., 2011).

It is possible that income inequality predicts either one or both of the above forms of competitiveness. Future research questions include: Does income inequality specifically predict hypercompetitiveness (as it conveys the imperativeness of winning a place at the top of a stratified society)? In that case, could the positive associations between income inequality and academic dishonesty (Neville, 2012; see also Du, Chen, Chi, et al., 2021) or bullying (Elgar et al., 2009) be accounted for by hypercompetitiveness? Alternatively, does income inequality predict *both* hypercompetitiveness and self-developmental competitiveness? In that case, could the null association between income inequality and the income achievement gap (Chmielewski & Reardon, 2016) be accounted for by opposing processes via hypercompetitiveness and self-developmental competitiveness?

Conclusion

Income inequality is a "hot topic" in social science research and policy debates. We believe our work herein offers convincing evidence that income inequality fosters competitiveness at school, showing how macrolevel structural features of the economic system may get into the head of youth and shape microlevel psychological processes such as perceptions and motivations at school.

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[6] Scholars have identified a third form of competitiveness: avoidance-based competitiveness. Avoidance-based competitiveness is an ego-defensive form of competitiveness grounded in both fear of failure (feeling that one's defeat could cause others to belittle them) and fear of success (feeling that one's victory could cause others to resent them; Ryckman et al., 2009). However, because avoidance-based competitiveness has not been as extensively studied as the other two forms of competitiveness discussed herein, we have chosen to primarily focus the discussion on hypercompetitiveness and self-developmental competitiveness.

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