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published in

Children and Youth Services Review
2023

DOI (link to publisher)

[10.1016/j.chidyouth.2023.107316](https://doi.org/10.1016/j.chidyouth.2023.107316)

document version

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citation for published version (APA)

Li, W., Wu, J., Yang, Y., Yuan, M., Lin, J., & Kou, Y. (2023). Longitudinal relations between perceived economic inequality and prosocial behavior among Chinese adolescents: The mediating role of system justification. *Children and Youth Services Review*, 155, 1-8. Article 107316. <https://doi.org/10.1016/j.chidyouth.2023.107316>

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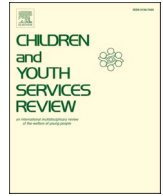
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Longitudinal relations between perceived economic inequality and prosocial behavior among Chinese adolescents: The mediating role of system justification

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ARTICLE INFO

Keywords:

Economic inequality
Prosocial behavior
System justification
Adolescents
Cross-lagged panel model

ABSTRACT

Despite a growing awareness of the detrimental effects of economic inequality, less is known about whether adolescents' perception of economic inequality relates to their long-term development. This study examined the relations between perceived economic inequality, system justification, and prosocial behavior in a three-wave longitudinal study among 1,525 Chinese adolescents (50.1% boys; M_{age} at Wave 1 = 12.47 years, $SD = 0.69$). Results from cross-lagged panel models revealed that perceived economic inequality predicted less prosocial behavior, and system justification mediated this association. System justification also predicted lower perceived economic inequality longitudinally. These findings enrich our understanding of the macro-level economic factors as predictors of prosocial behavior and highlight the negative effects of economic inequality on adolescents' social development.

1. Introduction

Prosocial behavior, the action that is intended to benefit others, is essential for adolescents' positive development (Eisenberg et al., 2006; Padilla-Walker et al., 2018). Existing literature indicates significant changes in prosocial behavior during adolescence (Carlo et al., 2007), and suggests that both micro- and macro-level environmental factors (e.g., parenting styles, media exposure) may influence prosocial development (Prot et al., 2014; Vaughan et al., 2021). With social stratification becoming more severe worldwide (Alvaredo et al., 2018), a number of studies have revealed that economic inequality contributes to various maladaptive outcomes, such as worse physical and mental health (Du et al., 2019; Wilkinson & Pickett, 2017) and more risky behaviors (Payne et al., 2017). Nevertheless, an important but unanswered question is how adolescents subjectively perceive the level of economic inequality, and whether this perception relates to their prosocial behavior. The present study aims to bridge this research gap by

investigating the longitudinal links between perceived economic inequality and adolescents' prosocial behavior, while also testing the potential mechanisms underlying this relationship.

Specifically, this study explores the longitudinal associations between adolescents' perceptions of economic inequality and their prosocial behavior in the Chinese context. Existing research has predominantly examined the perceptions of economic inequality within the context of the United States (e.g., Arsenio & Willems, 2017; Elenbaas & Mistry, 2021; Flanagan & Kornbluh, 2019), but the understanding of this phenomenon beyond this specific cultural setting is limited. China has undergone a steep increase in inequality over the past four decades, as indicated by the rise in Gini coefficient from 0.3 in 1980 to over 0.5 in the 2010s, an increase more pronounced than that in many other countries, including the United States (Xie & Zhou, 2014). Consequently, understanding how Chinese adolescents perceive economic inequality, and whether this perception relates to their prosocial behavioral decisions, holds both practical and theoretical implications.

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<https://doi.org/10.1016/j.chilyouth.2023.107316>

Received 19 January 2023; Received in revised form 11 July 2023; Accepted 2 November 2023

Available online 4 November 2023

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1.1. Adolescents' perception of economic inequality and prosocial behavior

Economic inequality can be conceptualized in two ways: At the macro level, economic inequality can be represented by objective indicators (e.g., the Gini index) reflecting the actual distribution of wealth; At the individual level, economic inequality can be assessed as how individuals subjectively perceive inequality (Schmalor & Heine, 2022). A growing body of research suggests that individuals' subjective perceptions of economic inequality bear a stronger influence on psychological and behavioral outcomes compared to objective economic inequality (Vezzoli et al., 2022; Willis et al., 2022). Therefore, this study focused on subjective perception of economic inequality.

Previous research suggests that adolescents are aware of the existence of unequal wealth distribution, but they tend to underestimate the level of inequality (Barreiro et al., 2019). For instance, one study found that American adolescents estimated the richest 20% of people to hold 47% of total wealth, while the actual figure was 84% (Arsenio & Willem, 2017). During late childhood and adolescence, youths' social cognitive abilities continue to develop, and they become more interested in the broader social environment beyond the family (Flanagan & Tucker, 1999; Smetana & Villalobos, 2009). Consequently, as adolescents mature, they tend to display heightened awareness of inequality (Barreiro et al., 2019; Wray-Lake et al., 2023) and a more nuanced understanding of wealth and poverty (Flanagan et al., 2014). Therefore, examining adolescents' perception of economic inequality and its behavioral implications holds significant importance (see also Ruck et al., 2019).

This study aims to investigate whether perceived economic inequality is related to adolescents' prosocial behavior. According to the socialization perspective of prosocial behavior, external factors such as family, community, and societal characteristics can significantly influence the development of prosocial behavior (Carlo, 2014; Eisenberg et al., 2015). However, limited research has specifically focused on how macro-level factors, such as economic inequality, relate to prosocial behavior. Two theoretical perspectives suggest that perceived economic inequality might correlate with reduced prosocial behavior. First, the theory of reciprocal altruism proposes that individuals are more likely to engage in prosocial behavior when they anticipate reciprocity from others (Axelrod & Hamilton, 1981; Romano et al., 2022). Economic inequality amplifies disparities between individuals and undermines interpersonal trust (Oishi et al., 2011; Yang & Xin, 2020). Under such circumstances, adolescents may develop lower expectations of reciprocity, leading to a decrease in prosocial behavior as they anticipate a higher risk of their prosocial actions being exploited rather than reciprocated. Second, the model of representations and consequences of economic inequality (Peters & Jetten, 2023) highlights that economic inequality fosters a stronger inclination to pursue status and personal goals rather than collective goals. In line with these propositions, previous research has shown that residents in areas with high economic inequality display lower agreeableness (de Vries et al., 2011), and individuals exposed to scenarios involving high inequality report increased materialistic values (Wang et al., 2022). Notably, both agreeableness and lower materialistic values are robust predictors of prosocial behavior (Thielmann et al., 2020; Yang et al., 2018). Based on this reasoning, we hypothesized that adolescents' perceived economic inequality would be negatively associated with their prosocial behavior (*Hypothesis 1*).

Consistent with this rationale, some preliminary evidence shows that making inequality visible decreases adult participants' cooperation in a public goods game (Nishi et al., 2015). In addition, a cross-cultural study reveals that individuals from countries with higher income inequality display lower social mindfulness, which reflects individuals' intention to engage in low-cost cooperation (Van Doesum et al., 2021). Notably, even children as young as four years old exhibited less altruistic behavior when exposed to a high-inequality situation compared to a

low-inequality situation (Kirkland et al., 2020). However, to the best of our knowledge, no empirical research to date has examined the longitudinal relations between perceived economic inequality and adolescents' prosocial behavior. Therefore, the current study employs a longitudinal design to test the prospective relations between these constructs.

1.2. System justification as an underlying mechanism

We propose that system justification may serve as a meaningful mediator in the association between perceived economic inequality and prosocial behavior. System justification, a construct put forward by the system justification theory, refers to the extent to which people perceive the society as fair and their willingness to justify the social system (Kay & Jost, 2003; Jost, 2019). Existing studies have shown that children aged 7–8 years have already shown an aversion to inequality (Fehr et al., 2008), and even infants are sensitive to unequal distributions (Ziv & Sommerville, 2017). Considering this tendency among younger children, it is reasonable to expect that adolescents who perceive larger economic inequality may consider the society as less fair and are less likely to justify the system. Consistent with this reasoning, previous cross-sectional evidence from U.S. and Argentine samples shows that higher perceived economic inequality is associated with lower perceptions of social fairness among adolescents (Barreiro et al., 2019; Flanagan & Kornbluh, 2019).

However, cross-sectional evidence cannot rule out the possibility of reverse causality that system justification beliefs may also lead to a lower perception of economic inequality. Indeed, system justification theory proposes that the motivation to justify the system can lead to biased social cognition (Jost, 2019). For instance, people with higher system justification are more likely to ignore environmental problems (Feygina et al., 2010) and are less likely to participate in collective actions (Osborne et al., 2019). Importantly, when faced with inequality scenarios, people with higher system justification report lower levels of negative emotions and show fewer physiological reactions (Goudarzi et al., 2020). A recent longitudinal study also revealed that the legitimization of inequality predicted lower perceived economic inequality six years later (Du & King, 2021). Therefore, it is reasonable to expect that higher system justification in turn leads to lower perceived economic inequality. In the present study, we utilized the strength of longitudinal design to test the hypothesis that there is a bi-directional relationship between perceived economic inequality and system justification (*Hypothesis 2*).

System justification may subsequently relate to prosocial behavior. Tyler (2006) postulated that perceptions of fairness and legitimacy can motivate people to focus more on the collective interest and engage in cooperative behaviors. In contrast, individuals with low levels of system justification, who are less satisfied with the status quo, may experience heightened relative deprivation (Osborne et al., 2019). Relative deprivation is characterized by a belief that one receives fewer resources than deserved and is often accompanied by feelings of anger and resentment (Smith et al., 2012). This sense of relative deprivation can subsequently reduce prosocial behavior because people feel their own deservingness are not being met (Callan et al., 2017). In line with this reasoning, studies have found negative correlations of perceptions of procedural justice, distributive justice, and fairness of institutional authorities with adolescents' deviant behavior (Sanchez et al., 2012), whereas adolescents' belief in a just world is positively associated with prosocial behavior (De Caroli & Sagone, 2014). Therefore, system justification may be associated with increased prosocial behavior. Based on this reasoning, we expected that system justification would mediate the association between perceived economic inequality and prosocial behavior (*Hypothesis 3*).

1.3. The current study

In this study, we aim to investigate the longitudinal relations between perceived economic inequality, system justification, and prosocial behavior in a three-wave longitudinal study among Chinese adolescents. We expected that (1) perceived economic inequality would be related to lower prosocial behavior (*Hypothesis 1*), that (2) perceived economic inequality and system justification would have a bidirectional relation (*Hypothesis 2*), and that (3) system justification would mediate the association between perceived economic inequality and prosocial behavior (*Hypothesis 3*). To test these hypotheses, we applied cross-lagged panel model (CLPM), which can provide more information about the directionality between variables.

2. Method

2.1. Participants and procedures

Data of this study were drawn from the Children and Adolescents' Social Competence Development Project. In this project, we recruited participants from five urban public junior high schools located in three cities across mainland China (Beijing in the north, Chongqing in the southwest, and Quanzhou in the southeast). Before starting the project, we conducted a priori power analysis to estimate the sample size based on the goal of having sufficient power ($1-\beta = 0.90$) to detect small correlations ($r = 0.10$) between key variables at a significant level of $\alpha = 0.05$ (two-sided; [Faul et al., 2007](#)). This analysis revealed a required sample of at least 1,043 participants. To account for sample attrition across multiple waves, we determined to recruit about 1,500 participants in the first wave. Finally, the first wave of data, which was collected in the autumn of 2017, included 1,525 adolescents from 7th grade (50.1% male; $M_{\text{age}} = 12.47$ years, $SD = 0.69$). The second ($N = 1,262$; 48.6% male; $M_{\text{age}} = 13.38$ years, $SD = 0.59$) and third ($N = 1,124$; 47.8% male; $M_{\text{age}} = 14.41$ years, $SD = 0.59$) waves of data were collected when participants were in 8th and 9th grades with one year in between.

The majority of our participants identified themselves as Han ethnicity (93.8%), which aligns closely with the ethnic distribution in mainland China, where 91.1% of the population identifies as Han ([National Bureau of Statistics of China, 2021](#)). The remaining participants belong to various ethnic minority groups (e.g., Man and Hui). Participants' family monthly income distribution was as follows: below 2000 RMB (2.0%), 2001–5000 RMB (21.3%), 5001–10,000 RMB (31.1%), 10,001–20,000 RMB (24.7%), above 20,000 RMB (19.4%), or not reported (1.4%). This distribution generally reflects the income distribution of urban Chinese families. Participants' father's education varied from junior high school or lower (25.0%), senior high school (21.2%), junior college (9.0%), undergraduate (26.4%), to postgraduate (16.9%), with some cases unreported (1.6%). Participants' mother's education was junior high school or lower (28.2%), senior high school (18.7%), junior college (12.9%), undergraduate (26.1%), postgraduate (12.9%), or not reported (1.2%).

This project was approved by the research ethics committee of the correspondence author's institution. We obtained informed consent from teachers, parents, and the youth themselves. Adolescents completed the questionnaire in classrooms under the guidance of well-trained graduate students. They received small gifts after completing each wave of assessment.

2.2. Measures

2.2.1. Perceived economic inequality

Various methods have been used to measure individuals' perception of economic inequality. Some studies asked participants to estimate the percentage of income that goes to each of the five income quintiles ([Norton & Ariely, 2011](#)), or to estimate the ratio of the perceived income

of CEOs and unskilled workers ([Kiatpongsan & Norton, 2014](#)). However, these methods are shown to be cognitively demanding, such that even a large proportion of adults cannot understand the item or fill out the questionnaire properly ([Heiserman & Simpson, 2021](#)). To make the measure of perceived economic inequality less cognitively demanding and easier for adolescents to understand, we adopted a single-item measure (see also [Du & King, 2021](#); [Jachimowicz et al., 2020](#), Study 6) by asking "Generally speaking, how do you perceive the gap between rich and poor in current China?". Participants responded to this item on a seven-point scale (1 = *very small*, 7 = *very large*).

2.2.2. System justification

The original System Justification Scale consists of eight items ([Kay & Jost, 2003](#)) and has been translated into Chinese in previous studies ([Li et al., 2020b](#)). We adopted three items from this scale to measure adolescents' system justification due to time constraints in filling out the questionnaire. These items were "In general, I find Chinese society to be fair", "In general, Chinese political system operates as it should", and "Chinese society is getting worse every year" (reverse-scored). Previous studies using a brief version of the system justification scale have shown good psychometric properties (e.g., [Osborne et al., 2019](#); [Vargas-Salfate et al., 2018](#)). Participants rated each item on a seven-point scale (1 = *completely disagree*, 7 = *completely agree*). The McDonald's omega for three items in three waves was 0.83, 0.84, and 0.83, respectively.

2.2.3. Prosocial behavior

We assessed adolescents' prosocial behavior via a hypothetical dictator game. Prior studies have demonstrated that economic games, such as the dictator game, exhibit high external validity, as people's decision in economic games correlated with their prosocial behavior in the field, such as donation to charity and returning misdirected letters ([Benz & Meier, 2008](#); [Franzen & Pointner, 2013](#)). These games have also been effectively employed among children and adolescent samples ([El Mallah, 2020](#)). In this study, participants were asked to imagine that they were paired with a partner to play a game, during which they had to decide how much (from 0 to 100) out of CN¥100 to give to their partner if (a) this partner was a stranger they would never meet again, (b) this partner was a schoolmate from another class, and (c) this partner was a classmate. In this hypothetical dictator game, higher allocations indicate that participants are willing to sacrifice their own interests in favor of their partner's welfare, thus reflecting higher levels of prosociality. On average, adolescents allocated the most money to classmates ($M = 50.3$, 50.1, and 46.5 across three waves), then to schoolmates ($M = 40.3$, 41.5, and 38.4 across three waves), and the least to strangers ($M = 34.2$, 35.5, and 33.4 across three waves). However, given the high correlations between these three indicators ($r_s > 0.50$, $p_s < 0.001$), we combined them into a single latent variable to represent participants' prosociality. The McDonald's omega of three indicators across three waves was 0.86, 0.87, and 0.87, respectively.

2.2.4. Control variables

We included gender and age as control variables because there might be gender and age differences in adolescents' prosocial behavior (e.g., [Luengo Kanacri et al., 2013](#); [Van der Graaff et al., 2018](#)). We also measured (at Wave 1) and controlled for socioeconomic status (SES) indicators because SES may relate to system justification ([Li et al., 2020b](#)) and prosocial behavior ([Piff et al., 2010](#)). Adolescents reported their family monthly income and parental education level on five-point scales. To measure subjective SES, we used the MacArthur Scale of subjective SES ([Adler et al., 2000](#)), which presented participants with a drawing of a ladder with 10 rungs representing different levels of social status. We modified the question to prompt adolescents to report their family's status rather than their individual status. Accordingly, participants were instructed to rate between 1 and 10.

2.3. Analytic plan

We first investigated the patterns of missing data in our study. Then, we tested longitudinal measurement invariance to ensure that research variables were measured equivalently across waves. Third, we tested the longitudinal relations between perceived economic inequality and prosocial behavior, and the mediating role of system justification, through CLPM. In these analyses, system justification and prosocial behavior were modeled as latent variables, while gender, age, and SES indicators were included as control variables. The descriptive statistics and correlations were analyzed using SPSS 21 software (IBM Corp, 2012). Structural equation modeling (SEM) was conducted using Mplus 8.3 (Muthén & Muthén, 1998–2018). We evaluated the fit of SEM using the comparative fit index (CFI) and the Tucker–Lewis index (TLI), with values higher than 0.90 indicative of an acceptable fit. We also evaluated the root mean square error of approximation (RMSEA) and the standardized root mean square residual (SRMR), with values below 0.08 indicative of an acceptable fit (Little, 2013). We reported but did not rely on chi-square value as an indicator of model fit, given that chi-square is sensitive to large samples (Bentler & Bonnet, 1980).

3. Results

3.1. Missing data and attrition analyses

The proportion of missing values ranged from 0.7% to 11.0% among research variables. Little’s test was significant, $\chi^2(835) = 1072.42, p < .001$, indicating that they were not missing completely at random. We further tested attrition by comparing participants who completed the survey at Wave 3 with those who dropped out before Wave 3. Participants who took part in the Wave 3 survey were younger (12.42 years versus 12.61 years), $t(534.50) = -3.88, p < .001, d = -0.25$, comprised more girls (51.3% versus 37.3%), $\chi^2(1) = 22.02, p < .001, \phi = 0.12$, and reported a higher level of system justification ($M = 5.10$ versus $M = 4.87$), $t(1391) = 2.47, p = .014, d = 0.15$. There were no significant differences in perceived economic inequality, prosocial behavior, and SES indicators (all $ps > 0.11$). Because all effect sizes for the differences were small, it is unlikely that attrition would cause bias in our results. To account for missing data in the analyses, we applied the full information maximum likelihood (FIML) method, which can generate unbiased and effective parameter estimates using complete data information (Enders & Bandalos, 2001).

3.2. Descriptive statistics and correlations

Table 1 presents the descriptive statistics and bivariate correlations for the key variables. The directions of the correlations within and between waves were consistent with our hypotheses. Overall, perceived economic inequality was negatively correlated with prosocial behavior, although the effect sizes were small. System justification was negatively associated with perceived economic inequality and was positively

Table 1
Descriptive Statistics and Bivariate Correlations for Key Variables.

	M (SD)	1	2	3	4	5	6	7	8	9
1. PEI W1	4.72 (1.44)	—								
2. PEI W2	5.03 (1.38)	0.31***	—							
3. PEI W3	5.02 (1.26)	0.25***	0.44***	—						
4. SJ W1	5.04 (1.47)	-0.22***	-0.16***	-0.18***	—					
5. SJ W2	4.72 (1.45)	-0.21***	-0.26***	-0.26***	0.47***	—				
6. SJ W3	5.04 (1.38)	-0.20***	-0.20***	-0.33***	0.35***	0.51***	—			
7. PB W1	41.63 (20.37)	-0.08*	-0.09**	-0.04	0.20***	0.14***	0.14***	—		
8. PB W2	42.36 (20.49)	-0.09**	-0.10**	-0.06	0.13***	0.18***	0.15***	0.36***	—	
9. PB W3	39.44 (20.13)	-0.06*	-0.08*	-0.12***	0.14***	0.18***	0.22***	0.32***	0.37***	—

Note. PEI = perceived economic inequality, SJ = system justification, PB = prosocial behavior. W1 to W3 represents Wave 1 to Wave 3 of data collection. * $p < .05$. ** $p < .01$. *** $p < .001$.

associated with prosocial behavior.

3.3. Longitudinal measurement invariance

To test longitudinal measurement invariance, we sequentially built three models: (1) a configural invariance model, in which the factor loadings were permitted to vary across waves, (2) a metric invariance model, in which factor loadings were constrained to be equal across waves, and (3) a scalar invariance model, in which both factor loadings and intercepts were constrained to be equal across waves (Widaman et al., 2010). Invariance was then tested based on whether the changes in CFI were < 0.01 (Cheung & Rensvold, 2002). If scalar invariance does not hold, we free certain constraints on the intercept to see whether partial scalar invariance can be achieved. Results indicated that prosocial behavior achieved scalar invariance, and system justification achieved partial scalar invariance (see Table S1 in Supplementary Material). Factor loadings of each indicator (all $\beta s > 0.50, ps < 0.001$) were reported in Table S2.

3.4. Cross-lagged panel models

We first tested the longitudinal relations between perceived economic inequality and prosocial behavior. The model fit the data well: $\chi^2(86) = 442.67, p < .001, CFI = 0.94, TLI = 0.92, RMSEA = 0.056, 90\% \text{ confidence interval (CI)} [0.051, 0.061], SRMR = 0.06$. We next constrained the structural parameters across time to determine the most parsimonious model, and the results suggested that such constraints did not lead to a worse fit: $\Delta \chi^2 = 8.66, \Delta df = 4, p = .07$. The final model fit the data well (see Fig. 1): $\chi^2(90) = 451.33, p < .001, CFI = 0.94, TLI = 0.92, RMSEA = 0.055, 90\% \text{ CI} [0.050, 0.060], SRMR = 0.06$. Consistent with Hypothesis 1, the cross-lagged paths from perceived economic inequality to prosocial behavior were significant. The cross-lagged paths from prosocial behavior to perceived economic inequality were not significant.

Next, we tested whether system justification mediated this longitudinal relation. We followed a similar procedure to determine the most parsimonious model. In the final model (see Fig. 2), the cross-lagged paths from perceived economic inequality to system justification were not constrained, while other cross-lagged paths were constrained to be equal across time. This model fit the data well: $\chi^2(253) = 986.86, p < .001, CFI = 0.94, TLI = 0.92, RMSEA = 0.047, 90\% \text{ CI} [0.044, 0.050], SRMR = 0.06$. Results revealed that perceived economic inequality at Wave 1 predicted lower system justification at Wave 2, but perceived economic inequality at Wave 2 did not significantly predict system justification at Wave 3. The cross-lagged paths from system justification to perceived economic inequality were significant. Thus, Hypothesis 2 was partially supported. With respect to Hypothesis 3, system justification predicted lower prosocial behavior across waves, and the indirect effect of perceived economic inequality at Wave 1 on prosocial behavior at Wave 3 through system justification at Wave 2 was significant, $\beta = -0.004, 95\% \text{ CI} [-0.006, -0.001]$. We also explored whether the targets (i.

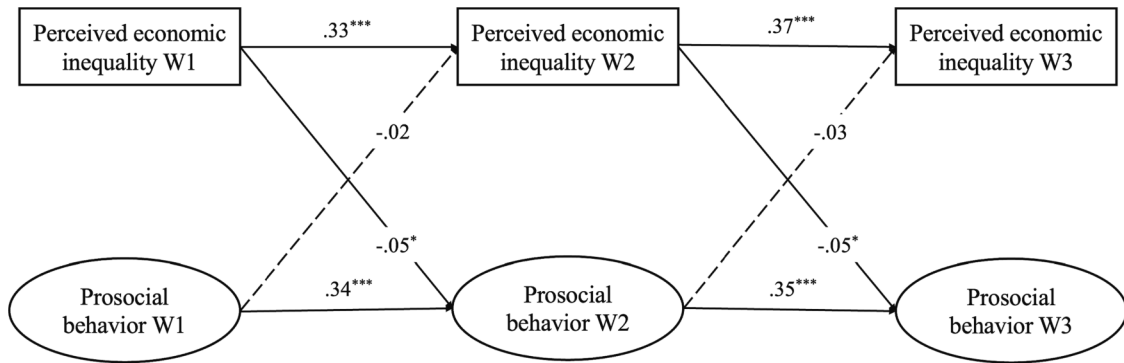


Fig. 1. Cross-Lagged Panel Model of the Relation between Perceived Economic Inequality and Prosocial Behavior. Note. All path coefficients are standardized. Dotted lines indicate nonsignificant paths. Gender, age, and SES indicators were included as control variables. Within-wave correlations were included in the model but was not displayed in the figure for clarity. W1 to W3 represent Wave 1 to Wave 3. * $p < .05$. *** $p < .001$.

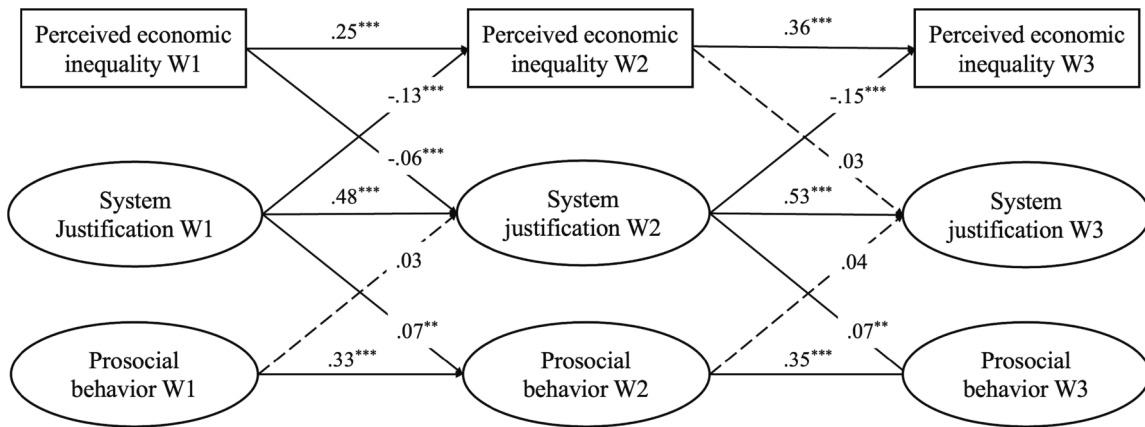


Fig. 2. Cross-Lagged Panel Model of the Relations between Perceived Economic Inequality, System Justification, and Prosocial Behavior. Note. All path coefficients are standardized. Dotted lines indicate nonsignificant paths. Gender, age, and SES indicators were included as control variables. Within-wave correlations were included in the model but was not displayed in the figure for clarity. W1 to W3 represent Wave 1 to Wave 3. ** $p < .01$. *** $p < .001$.

e., strangers, schoolmates, and classmates) of prosocial behavior in the dictator game affected the results by treating it as three dependent variables, and the results were similar (see Figure S1 in the Supplementary Material).

4. Discussion

At a time that economic inequality is rising worldwide, it is critical to investigate the associations between economic inequality and adolescents' development. Using a large longitudinal sample of Chinese adolescents, the present study offers the first empirical evidence that perceived economic inequality predicted lower prosocial behavior over time, and system justification mediated this longitudinal association. We also found that system-justification beliefs predicted lower perceived economic inequality longitudinally. Thus, we believe these findings make important contributions to the psychology of economic inequality and literature regarding adolescents' prosocial development. We discussed these findings in the following sections.

4.1. Perception of economic inequality and prosocial behavior

Our findings demonstrated a small-to-moderate level of stability in adolescents' perception of economic inequality, indicating that adolescents' understanding of this complex issue is susceptible to change. As adolescents mature, their social cognitive abilities continue to develop, and they are exposed to a wider range of social and economic information (Flanagan & Tucker, 1999; Smetana & Villalobos, 2009).

Consequently, they may gradually form a more consistent and robust understanding of economic inequality over time. This finding highlights the importance of employing longitudinal designs in this research domain as they allow for capturing the dynamic nature of adolescents' perception of inequality over time.

Most of the existing studies examining the consequences of economic inequality have focused on adult populations and demonstrated that economic inequality can lead to various maladaptive consequences (Buttrick & Oishi, 2017; Willis et al., 2022). Only a few studies have investigated adolescents' perceptions of economic inequality, but most of them used a cross-sectional design. Our study used a longitudinal design and revealed that higher perceived economic inequality was associated with less prosocial behavior at a later time. This finding contributes to the socialization perspective of prosocial behavior by demonstrating the relations between macro-level societal factors and prosocial behavior, and further elucidates the potential negative consequences of economic inequality. In addition, in light of recent scholarly advocacy for studying prosocial behavior through a multidimensional perspective (Carlo & Padilla-Walker, 2020), we also examined the relations between perceived economic inequality and prosocial behavior toward different targets (i.e., strangers, schoolmates, and classmates). Analyses revealed that the results on prosocial behavior toward different targets were similar to the results based on the composite score. Taken together, these findings underscore the detrimental roles of perceived economic inequality in predicting all forms of prosocial behavior among adolescents, regardless of whether it is directed towards a stranger, schoolmate, or classmate.

4.2. Perceived economic inequality, system justification, and prosocial behavior

Previous studies using adolescent samples have found a negative relationship between perceived economic inequality and perceived social fairness (Barreiro et al., 2019; Flanagan & Kornbluh, 2019), but these studies used cross-sectional designs and provided little information for causal reference. The current study provided a novel finding that perceived economic inequality and system justification can predict each other longitudinally. On the one hand, adolescents who perceived higher levels of economic inequality will have a subsequent rank-order decrease in system justification compared to others who perceived lower economic inequality. Notably, we found that the path from perceived economic inequality to system justification became nonsignificant from Wave 2 to Wave 3. This result is hard to interpret, but one plausible explanation is that when adolescents grow older, they have a more complex understanding and attribution of economic inequality, such that their judgement of social fairness is less influenced by the absolute level of economic inequality. Nevertheless, this finding is preliminary and should be investigated in future research. On the other hand, we found that adolescents with higher system justification tend to have a subsequent rank-order decrease in perceived economic inequality. Thus, our results provided longitudinal evidence for the proposition of system justification theory that system justification can serve as an ideological buffer against negative social consequences and lead to biased social cognition (Jost, 2019).

The present study further revealed that system justification mediated the longitudinal relations between perceived economic inequality and prosocial behavior. That is, adolescents tend to feel unfair and unwilling to justify the system when they perceive high inequality, and thus are less likely to behave in a way that benefits others. Previous studies have also demonstrated the important role of system justification in predicting individuals' psychological well-being and social functioning. For instance, system justification has been found to positively predict adolescents' psychological well-being (Li et al., 2020a). System justification beliefs also have self-regulatory functions, such that people are more likely to hold long-term goals when they perceive the system as fair (Laurin et al., 2011). One study conducted by Elenbaas & Mistry (2021) is particularly relevant to our findings. In their study, adolescents were asked to distribute opportunities between poor and rich peers, and the results indicated that participants with higher system justification were less likely to allocate opportunities to poor peers over their wealthier counterparts. Although this result may appear to contradict our finding that system justification is associated with higher prosocial behavior, it is important to note that these two studies addressed distinct research questions using essentially different tasks. Our findings suggest that when adolescents perceive the society as unfair, they tend to retain more resources for themselves and distribute fewer to others. In contrast, Elenbaas & Mistry (2021) demonstrated that when adolescents perceive the society as unfair, they tend to allocate more opportunities to poor peers over wealthier peers. Taken together, these findings highlight the importance of system justification in predicting adolescents' emotional and behavioral outcomes.

Given the potential culture differences in understandings of inequality (Blake et al., 2015) and prosocial behavior (Parks & Vu, 1994), we encourage future studies to further examine the longitudinal relationships between perceived economic inequality, system justification, and prosocial behavior in other cultural contexts. Here, we are more inclined to speculate that the observed associations might be universal applicable. While there may exist cultural variations in the onset age and developmental trajectories of children's aversion to inequality (Blake et al., 2015), a general tendency of inequality aversion before adolescence has been documented across cultures (e.g., US and China; Li et al., 2022). This suggests that older children and adolescents, regardless of their cultural contexts, are prone to perceive unequal distributions as unfair. Consistent with this notion, both our research and

prior studies conducted in the US (Flanagan & Kornbluh, 2019) and Argentina (Barreiro et al., 2019) have found a negative correlation between adolescents' perceived economic inequality and system justification. Moreover, considering the expectation of reciprocity across cultures, the associations between perceived economic inequality or system justification and prosocial behavior may also generalize to other cultural contexts. However, these presumptions remain speculative and warrant empirical examination in future research.

In addition, we noted that the effect sizes of the cross-lagged effects in the CLPM were relatively small. Nevertheless, since CLPM has controlled for past levels of outcome variables, the effect size should be interpreted differently compared to cross-sectional research (Adachi & Willoughby, 2015). Based on empirical analyses of previous longitudinal studies, Orth et al. (2022) proposed standardized regression coefficient of 0.03, 0.07, and 0.12 as benchmarks for small, medium, and large effects for cross-lagged effects in CLPM. Based on this criterion, our findings suggest small-to-medium effects between the main research variables. Therefore, we believe that the effects of economic inequality on adolescents' development are important and should not be overlooked.

4.3. Strengths, Limitations, and directions for future research

The present study harnessed the strength of large samples from a non-Western context and a longitudinal design to test the relations between perceived economic inequality, system justification, and prosocial behavior. Nevertheless, several limitations of the present study merit attention. First, our measure of adolescents' perceived economic inequality was based on a single item. Future research can assess perceived economic inequality using multiple items (Schmalor, & Heine, 2022) or other paradigms (e.g., pictorial images of wealth distribution; e.g., Flanagan & Kornbluh, 2019) that capture more information than the single-item measurement. Second, we measured prosocial behavior using a hypothetical dictator game, a scenario where participants did not encounter real interaction partners and their decisions did not have actual monetary consequences. To enhance the validity of our findings, future studies could consider using incentivized economic games with real interaction partners and material rewards. Alternatively, prosocial behavior could be assessed via ratings from other sources, such as parents, teachers, or peers. This multi-source assessment would provide a more comprehensive picture of adolescents' prosocial behavior beyond self-report measures. Third, our sample was limited to adolescents from urban areas. Future research could enhance the sample representativeness by including students from rural areas. This would enable a more comprehensive understanding of how perceived economic inequality relates to system justification and prosocial behavior across different social backgrounds.

5. Conclusions

As economic inequality has risen worldwide, researchers noted that adolescents have begun to develop an understanding of economic inequality and this subjective perception of inequality may relate to a series of attitudinal and behavioral outcomes (Arsenio & Willems, 2017; Barreiro et al., 2019; Flanagan & Kornbluh, 2019). Our study extends this literature by examining the relationship between adolescents' perceptions of economic inequality and their prosocial behavior using a longitudinal design. Using cross-lagged panel models, we found that higher perceived economic inequality predicted reduced prosocial behavior over time, and that system justification mediated this longitudinal relation. Consistent with the proposition of system justification theory, we also observed a bi-directional association between perceived economic inequality and system justification across waves. These findings thus enrich our understanding of the antecedents of adolescents' prosocial behavior and highlight the critical role of reducing economic inequality as a means to foster positive youth development.

Ethical statement

This study was approved by the Ethics Committee of the Faculty of Psychology, Beijing Normal University. Written consent was obtained from all adolescents and their parents.

Funding

This research was supported by the National Natural Science Foundation of China (32200881, 31971011), the China Postdoctoral Science Foundation (2022M711572), and the Jiangsu Funding Program for Excellent Postdoctoral Talent.

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

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.childev.2023.107316>.

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