frontiers | Frontiers in Developmental Psychology

TYPE Original Research
PUBLISHED 15 October 2024
DOI 10.3389/fdpys.2024.1472589

OPEN ACCESS

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RECEIVED 29 July 2024
ACCEPTED 18 September 2024
PUBLISHED 15 October 2024

CITATION
Cirimele F, Pastorelli C, Remondi C, Zuffianò A, Thartori E, Gerbino M, Di Giunta L, Bacchini D, Oburu P, Skinner AT, Sorbring E, Steinberg L, Uribe Tirado LM, Yotanyamaneewong S, Peña Alampay L, Al-Hassan SM, Bornstein MH, Chang L, Deater-Deckard K, Dodge KA, Gurdal S, Junla D, Eisenberg N and Lansford JE (2024) The development of prosocial behavior from late childhood to adolescence: a longitudinal and multicultural study.
Front. Dev. Psychol. 2:1472589.
doi: 10.3389/fdpys.2024.1472589

The development of prosocial behavior from late childhood to adolescence: a longitudinal and multicultural study

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Introduction: Prosocial behavior (i.e., voluntary actions aimed at benefiting others, such as helping, comforting, and sharing) has proven beneficial for individuals' adjustment during the transition to adolescence. However, less is known about the role of the broader sociocultural context in shaping prosocial development across different cultures. Thus, the present study explored the longitudinal trajectory of prosocial behavior in the transition to adolescence (from ages 9 to 16) by examining the role of the Human Development Index (HDI) in relation to prosocial development.

Methods: A sample of 915 children (Time 1: 50.5% males; $M_{age} = 9.24$, $SD = 0.69$) across six countries (Colombia, Jordan, Italy, the Philippines, Thailand, and the United States) participated in the study. Over four time points covering 7 years, prosocial behavior was assessed using a self-report measure.

Results: A second-order Latent Growth Curve Model, controlling for child gender and family SES, showed that prosocial behavior remained stable in contexts with high HDI, whereas increases in prosocial behavior were evidenced as children moved into adolescence in contexts with low HDI. Moreover, cultural differences in the mean level of prosocial behavior were shown during late childhood and the earliest phase of adolescence, whereas the national development of a given context did not account for differences in prosocial behavior during late adolescence.

Discussion: Findings underscore that national life expectancy, education, and wealth play a role in age-related changes in other-oriented behaviors during adolescence. The role of sociocultural factors in shaping trajectories of prosocial behavior across six countries is discussed.

KEYWORDS

prosocial development, human development index, multicultural perspective, longitudinal study, adolescence

1 Introduction

Prosocial behavior, a wide range of voluntary and other-oriented behaviors that manifests as helping, comforting, and sharing with others, has attracted the interest of researchers in diverse fields due to its beneficial association with wellbeing of youth and society (Eisenberg et al., 2015; Hui et al., 2020; Taylor, 2020). Adolescents with higher prosocial behavior, compared with their less prosocial peers, have better functioning in intraindividual (e.g., self-esteem, emotion regulation, subjective wellbeing, low externalizing and internalizing problems; Caprara et al., 2000; Zuffianò et al., 2014, 2019; Hui et al., 2020; Memmott-Elison et al., 2020; Eisenberg et al., 2024; Gregori et al., 2024) and interindividual (e.g., positive relationships with peers, social acceptance; Zimmer-Gembeck et al., 2005; Wentzel, 2014; Padilla-Walker et al., 2015) domains of development.

Prosocial behavior follows a complex developmental pattern during the transition to adolescence. For example, although meta-analyses have suggested an increasing trend of prosocial behavior (Eisenberg and Fabes, 1998; Spinrad and Eisenberg, 2023; Zuffianò et al., 2023), longitudinal studies also reported stability (Flynn et al., 2015; Griese et al., 2016) or declining trends (Luengo Kanacri et al., 2013) of prosocial behavior. Such mixed findings are likely due to sampling characteristics (including country of the sample), assessment, or data analytical approach (see Eisenberg and Fabes, 1998 for a review).

Substantial efforts have been made to understand factors that may explain the variability in prosocial behavior during adolescence, but empirical evidence on prosocial development is limited and restricted to adolescents growing up in the minority world (i.e., those countries that include a minor percentage of adolescents; Khan et al., 2022), leaving unaccounted how prosocial behavior develops in the majority of the world (i.e., countries that include the majority of the adolescents' population; Khan et al., 2022).

Although adolescents across the globe help, comfort, and share with others every day, processes related to the development of prosocial behavior may not be universal (e.g., Pastorelli et al., 2021) and, instead, may vary according to differences in adolescents' broader lives, communities, and cultures (Bronfenbrenner and Morris, 2007). In this regard, there remains a notable gap in understanding sociocultural factors that influence the expression and development of prosocial behavior in diverse populations (Armstrong-Carter and Telzer, 2021). Exploring the developmental trend of prosocial behavior in a multicultural sample may inform about whether and how characteristics of a given context can shape the trajectory of other-oriented behaviors during a critical developmental period such as adolescence (Armstrong-Carter and Telzer, 2021; Davidov and Malti, 2023).

Thus, more research is needed to examine how prosocial behavior develops during adolescence and whether sociocultural factors at the country level (e.g., the country's wealth; Greenfield, 2009) shape this developmental trend. To address this gap, the present study extends prior work on the developmental trajectories of prosocial behavior in the transition to adolescence (from age 9 to 16) in a multicultural sample from six countries: Colombia, Jordan, Italy, the Philippines, Thailand, and the United States. In particular, this study sought to expand our understanding of the role played by the wealth condition at the country level (i.e., human development index; UNDP, 2014) in shaping prosocial development beyond the effect of demographic factors that influence prosocial behavior (i.e., gender and family SES).

1.1 The development of prosocial behavior during adolescence

The transition to adolescence is characterized by simultaneous changes at biological, cognitive, and social levels. During this period, adolescents become more independent in making decisions about their lives; they often withdraw from parental control and family bonding while increasing the quantity of time spent with their peers, facilitating social understanding of others (Steinberg and Morris, 2001). Moreover, adolescents achieve higher levels of sociocognitive and emotional competencies (e.g., emotion regulation, moral reasoning, empathy, perspective-taking) that enhance their prosociality (Silvers, 2022; Carlo et al., 2023; Spinrad and Eisenberg, 2023).

However, existing findings on mean-level change in the development of prosocial behavior highlighted heterogeneity in the development of prosocial behavior starting from middle childhood (Malti and Dys, 2018), which may depend on the time lag, the type of informant (e.g., self-report or teacher report), and sample characteristics (Eisenberg and Fabes, 1998). Considering children and adolescents, a meta-analysis of 179 studies conducted by Eisenberg and Fabes (1998) showed that adolescents were more likely to enact prosocial behavior than children. Accordingly, a longitudinal study by Carlo et al. (2024), involving 749 U.S. Mexican-origin adolescents (from ages 10 to 23) and using the self-report Prosocial Tendencies Measure–Revised (PMT-R; Carlo et al., 2003), showed a linear increase in the frequency of helping

behaviors without apparent rewards (i.e., altruistic behaviors; Carlo et al., 2024).

In contrast, other studies have found a stable trend for prosocial behavior during adolescence. For example, a study by Griese et al. (2016), including 1,091 U.S. children (from ages 8 to 12), showed that prosocial behavior, assessed by teacher report of the Child Behavior Scale (Ladd and Profilet, 1996), followed a stable trend from late childhood to early adolescence. Moreover, a longitudinal study with an extended time lag spanning from late childhood to early adulthood (from ages 9 to 18), involving 284 children from the southwestern United States, found that prosocial behavior, measured by the prosocial subscale of the Children's Social Behavior Scale-Teacher Form (CSBS-T; Crick, 1996), remained stable during the transition to adolescence (Flynn et al., 2015). These findings suggest that prosocial behavior, which may be learned earlier during childhood, acts with greater stability in interindividual differences over time, even in the light of developmental changes and external circumstances (Eisenberg et al., 1999).

In addition, other studies showed a quadratic trend in the development of prosocial behavior. A cohort longitudinal study by Carlo et al. (2007), involving 200 adolescents and young adults from rural Eastern United States (from ages 13 to 18), showed a declining trend in self-reported prosocial behavior (i.e., using the Primary Prevention Awareness, Attitudes and Usage Scale; Swisher et al., 1984) from middle to late adolescence (around age 16) with a subsequent rebound until approximately 18 years old. Similarly, a cohort longitudinal study by Luengo Kanacri et al. (2013) explored the developmental trend of self-reported prosocial behavior of 573 Italians from early adolescence to young adulthood (from ages 13 to 21), and reported a decline in prosocial behavior using the Prosociality Scale (Pastorelli et al., 1997; Caprara et al., 2005) during this developmental period.

In summary, findings about how prosocial behavior develops are not consistent across studies, perhaps because of methodological differences, such as the type of informant (e.g., self-report or teacher ratings; Eisenberg and Fabes, 1998) and sampling characteristics (Eisenberg and Fabes, 1998). In regard to the type of informant, considering self-report measures of prosocial behavior, which are particularly relevant to the present study, previous studies point to a decreasing trend (Carlo et al., 2007; Luengo Kanacri et al., 2013). However, in regard to sampling characteristics, to the best of our knowledge, no previous longitudinal research examined the prosocial behavior of adolescents from the majority world; rather, what is known about the average developmental trajectory of prosocial behavior comes from samples from the minority world (Armstrong-Carter and Telzer, 2021). Consequently, contextualizing studies across different nations may increase understanding of whether and how adolescents behave toward others depending on their context. Thus, the present longitudinal cross-cultural study has the potential to partly address this gap by tapping into longitudinal data of the same self-reported measure of prosocial behavior collected simultaneously across six countries.

1.2 Sociocultural context and prosocial behavior

Echoing the bioecological model (Bronfenbrenner and Morris, 2007), which suggests the dynamic interplay between multiple environments at proximal (e.g., family, peers) and distal (e.g., economic and political systems) levels in determining individuals' functioning, research on behavioral development is beginning to reveal insights into how countries' characteristics, such as the sociocultural context, interact with the development of adolescents' adaptive and maladaptive behaviors (Callaghan and Corbit, 2023; Lansford, 2024). Research on prosocial behavior has underscored its malleable nature and the role of the cultural context in shaping its trajectory (de Guzman et al., 2014; Callaghan and Corbit, 2023). For example, at the proximal level, children's inclination toward prosocial actions is nurtured within familial bonds, where caregivers model and encourage behaviors that benefit others (Eisenberg et al., 2015; Pastorelli et al., 2021). Observing and being encouraged to engage in prosocial actions can help children become aware of the importance of their contributions to the social group and facilitate the acquisition of a social identity (Miller and Goodnow, 1995). At the distal level, socioeconomic factors may shape the enactment of other-oriented behavior. As reported by the Organization for Economic Cooperation and Development (OECD, 2011), comparing 140 countries worldwide, the higher the country's income, the higher the adolescents' reported enactment of prosocial behaviors, such as volunteering, donating, and helping others.

However, other findings highlight the importance of considering broader indicators to capture the wealth condition of the cultural context (Bornstein et al., 2012, 2023), such as the Human Development Index (HDI; United Nations Development Programme, UNDP, 2014). The HDI is a broader indicator than solely country income, representing a reasonable index for capturing the extent to which human development is promoted at the country level. It encompasses several levels of a country's socioeconomic growth along three dimensions: (1) long and healthy life (i.e., life expectancy at birth), (2) knowledge (i.e., expected years of schooling and mean years of schooling), and (3) decent standard of living (i.e., gross national income per capita). Existing research evidenced the validity of the HDI in predicting wellbeing and adaptive functioning in the population. For example, higher HDI has been associated with better child physical growth and educational achievement (Zietz and Rothenberg, 2022), greater child socioemotional competencies (Bornstein et al., 2022), higher nurturing and stimulating interactions between caregivers and their children (Bornstein et al., 2022), as well as less caregiver psychological aggression and physical violence (Lansford et al., 2022). Moreover, Bornstein et al. (2022), with a sample of children from 51 low- and middle-income countries, showed that HDI is positively associated with children's socioemotional development beyond the effect of positive cognitive and emotional caregiving, suggesting that a sociocultural context characterized by high HDI, in concert with characteristics of the family environment, may foster the development of children's adaptive socioemotional competencies.

Deepening the understanding of how HDI may influence prosocial development by tapping on data from the "Parenting across Cultures" (Lansford and Bornstein, 2011) project is particularly important since the six countries of this study considerably vary on many HDI dimensions. For instance, in 2009, the UNDP classified 188 countries worldwide based on the HDI dimensions. Countries with the highest stand in this ranking were those with better health, education, and living conditions. The countries participating in the present study ranged from a rank of 11 (United States) to 111 (Philippines) out of 188 countries with available data (UNDP, 2009). To give an idea of what this range entails, in 2009, children living in the United States were 48% higher than children in the Philippines in the mean years of education. Similarly, children living in Italy were 40% higher in expected years of education compared with Jordanian children. Regarding health, in 2010, the Philippines showed 80% more inequality in life expectancy compared with Italy (the largest difference), and Thailand showed 42% more inequality in life expectancy compared with the United States (the smallest difference), suggesting that in low-HDI societies there is a greater inequality in health compared with high-HDI societies. Taken together, these data evidenced the great variability in the socioeconomic macro context of the countries involved in the present study. Given these premises, the present study sought to increase the field's understanding of how national efforts in promoting population potentialities (i.e., HDI) are related to the mean level and the rate of change of prosocial behavior during adolescence.

1.3 The present study

Based on the aforementioned considerations, the goal of the present study was 2-fold:

(1) to longitudinally examine the average developmental trajectory of prosocial behavior during the transition to adolescence (from ages 9 to 16), using data from six countries: Colombia, Italy, Jordan, the Philippines, Thailand, and the United States. Although the scarcity of longitudinal studies on prosocial behavior conducted in the majority world (Armstrong-Carter and Telzer, 2021), previous studies with similar characteristics to our methods (i.e., self-report measure of prosocial behavior) and developmental period (i.e., from late childhood to adolescence), identified a declining trend in self-reported prosocial behavior during the transition to adolescence (Carlo et al., 2007; Luengo Kanacri et al., 2013). Thus, one may hypothesize that adolescents' levels of prosocial behavior show an average decline from late childhood to adolescence.

(2) to explore whether the total HDI (i.e., a composite score of life expectancy at birth, schooling, gross national income per capita) is related to the developmental trajectory of prosocial behavior during adolescence. Although previous cross-sectional findings highlighted that those children growing up in countries with lower national income also reported lower levels of prosocial behavior compared with their counterparts (OECD, 2011; House et al., 2013), to the best of our knowledge, no previous studies investigated the role of HDI in shaping prosocial behavior trajectories. Thus, we hypothesized that higher HDI is associated with higher initial levels (i.e., the intercept) of prosocial behavior. No prediction was made about whether HDI is related to changes in the trajectory of prosocial behavior during adolescence.

Finally, we tested whether gender and family SES also play a role in the developmental trajectory of prosocial behavior. Researchers previously proposed that girls are typically socialized to exhibit more caring and nurturing behaviors, whereas boys are more often encouraged to cultivate self-interest and concern for their own needs, resulting in a greater tendency of girls to enact prosocial behavior than boys (van der Graaff, 2023). Thus, we hypothesized that girls would show higher levels of prosocial behavior than boys. Regarding family SES, although a review by Robinson and Piff (2017) highlighted that individuals from lower SES show greater cooperative and compassionate tendencies than high SES individuals, predisposing these individuals to enact more prosocial behavior, other empirical evidence suggested an opposite association. For example, a study by Korndörfer et al. (2015) involving 4,020 U.S. adults showed that high SES (i.e., income, education, and occupation) is associated with a high frequency of self-reported day-helping, suggesting that individuals with high SES may be more incline in helping others during their daily life, comparing with low SES individuals. Thus, due to the mixed evidence, we did not formulate a specific hypothesis on the role of families' SES on prosocial behavior.

2 Method

2.1 Participants

Participants were recruited from the longitudinal and cross-cultural study entitled: "Parenting Across Cultures" (e.g., Lansford et al., 2014). At Time 1 (T1), the present study sample included 915 children (50.5% males; $M_{age} = 9.24$, $SD = 0.69$, range 7–11) across six countries (Colombia, Italy, Jordan, the Philippines, Thailand, and the United States), who provided data over 7 years in 4 waves. Participants' characteristics at the following time points were: 884 participants averaged 10.34 years ($SD = 0.69$, range 8–13) at Time 2 (T2), 829 participants averaged 12.95 years ($SD = 0.77$, range 11–15) at Time 3 (T3), and 782 participants averaged 16.46 years ($SD = 0.91$, range 15–19) at Time 4 (T4).

2.2 Procedure

The present study used data collected in each country from 2009 to 2016, and the procedures were the same at each site (see Lansford and Bornstein, 2011; Lansford et al., 2016; Skinner et al., 2017 for more details about the study procedure). Letters describing the study were sent home from schools. Those parents who agreed to be contacted to participate in the study returned a signed form.

The research team of each country conducted translation and back-translation procedures to ensure the linguistic, conceptual, and cultural equivalence of the measures used. The study received approval from Institutional Review Boards (IRBs) at participating universities in each country. The interview procedure was performed as follows. Parental informed consent and children's assent were obtained at each wave before the interview started. Participants chose the location (e.g., home, university) for the interviews. Parents were given the choice between oral and written

completion of the interviews. In the initial years, interviewers carefully read each item of the questionnaire and recorded children's answers; in later years, children were given the choice between oral and written completion. For oral interviews, interviewers provided visual aids of rating scales. Interviews took approximately 2 h. In accordance with each country's IRBs, families received modest financial or other compensation for their participation.

2.3 Attrition

From T1 to T4, participants' rates remained moderate-high across time. Specifically, the retention rate was 83.0% over 7 years (i.e., from T1 to T4) and across countries. The attrition rate was principally due to the children's unavailability to participate in later data collection or their refusal to participate in that specific wave. Analyses of variance showed that the missing participants at T4 did not significantly differ from their counterparts in prosocial behavior at T1 [$F_{(1,914)} = 2.54$, $p = 0.111$], at T2 [$F_{(1,875)} = 0.59$, $p = 0.443$], and at T3 [$F_{(1,824)} = 3.21$, $p = 0.074$].

Regarding sociodemographic factors, mothers' years of education of missing participants were significantly lower than their non-missing counterparts [$M_{attrited} = 11.72$ vs. $M_{retained} = 12.83$; $F_{(1,864)} = 7.08$, $p < 0.05$]. No differences between missing participants and non-missing counterparts were found for gender [$F_{(1,914)} = 0.03$, $p = 0.853$], fathers' years of education [$F_{(1,767)} = 2.07$, $p = 0.151$], and family income [$F_{(1,864)} = 1.31$, $p = 0.252$].

2.4 Measures

2.4.1 Prosocial behavior

Prosocial behavior was measured using a 3-item self-report Prosocial Behavior Scale for children and adolescents (Caprara and Pastorelli, 1993; Pastorelli et al., 1997). Participants were asked to report their frequencies of helping ("I try to help others"), comforting ("I try to make people happier when they are sad"), and sharing ("I share things I like with my friends") behaviors. Each item was rated on a 3-point scale (1 = never/almost never to 3 = often). Omega reliability (ω) coefficients were ω = 0.62 at T1, ω = 0.62 at T2, ω = 0.62 at T3, and ω = 0.69 at T4.

2.4.2 Human development index

Differences in national wealth were measured with the Human Development Index (HDI) defined in 2009 by the United Nations Development Programme (UNDP, 2014), representing T1 of the present study. The HDI was retrieved from the Human Development Reports of the UNDP website (https://hdr.undp.org/data-center/human-development-index#/indicies/HDI). The HDI offers a country-level composite measure that ranges from 0 to 1, in which scores closer to zero represent lower achievements in 3 key dimensions of human development and scores closer to 1 represent higher achievements in 3 key dimensions of human development: life expectancy, education, and gross national income per capita. Scores lower than 0.550 represent low national human development, scores between 0.550 and 0.699 represent medium levels, scores between 0.700 and 0.799 represent high levels, and scores above 0.800 represent very high levels of human development. The countries involved in our study ranked in HDI as follows: the Philippines (0.67), Colombia (0.73), Jordan (0.73), Thailand (0.74), Italy (0.88), and the United States (0.92).

2.4.3 Gender

Children were asked to report their gender. This variable was coded 0 for boys and 1 for girls.

2.4.4 Family SES

Family SES was assessed using an average of standardized values within countries of mothers' reports of family income and mothers' and fathers' reports of their years of education.

2.5 Data analytic approach

At a preliminary level, we computed descriptive statistics and correlations (Pearson correlation coefficients) among all study variables within and across the four time points.

Given the longitudinal nature of our data, we performed a multiple-step analysis to (1) ensure the consistency of the prosocial behavior measure over time by using the Alignment Optimization (AO) recommended by Lai (2023) and (2) to model the change of prosocial behavior during the transition to adolescence (from 9 to 16 years old) by implementing a second-order Latent Growth Curve Model (LGCM; Bollen and Curran, 2006).

The AO approach is particularly suitable when one or more items measuring the construct of interest show non-invariant measurement properties in the metric and scalar model of the traditional measurement invariance approach (Vandenberg and Lance, 2000; Putnick and Bornstein, 2016), even though a configural model fit the data well (Marsh et al., 2018; Luong and Flake, 2023). Thus, using the AO allowed us to achieve a set of measurement parameter estimates that optimize non-invariant parameters while maintaining other parameters approximately invariant across time (Asparouhov and Muthén, 2014). Consequently, the AO allowed us to estimate growth factors adjusted for measurement biases in the prosocial behavior construct over time by assuming a minimum acceptable level of non-invariance (Marsh et al., 2018; Lai, 2023). Thus, we first implemented a configural longitudinal measurement invariance model, in which factor loadings, intercepts, and residual variances were freely estimated across time. Second, we extracted factor loadings and intercept estimates from the configural model. Third, we tested the AO. Fourth, to test the tenability of the AO model, we compared the configural model with the AO model using the following criteria: (a) < 30% of the pairwise comparisons using the effect size of the mean and covariance structure (d_{MACS}) are larger than 0.20, (b) < 50% of the items have at least one $d_{MACS} \geq 0.20$, and (c) the R^2 near 1 as indicator of complete invariance (Nye and Drasgow, 2011; Asparouhov and Muthén, 2014; Lai, 2023).

To test our first aim, once the longitudinal measurement model was established, we tested a series of unconditional second-order Latent Growth Curve Models (LGCM; Bollen and Curran, 2006)

by fixing the first factor loadings and intercepts at each wave to the parameters estimated using AO. In the LGCM, we estimated two additional latent factors: (1) the Intercept (I), which represents the predicted value of prosocial behavior at the initial time point and (2) the Slope (S), which represents the predicted rate of change of prosocial behavior over the four time-points (loadings set to 0, 1, 4, and 7). The LGCM allows estimating five parameters: (1) Intercept mean (I_M, i.e., the trajectory's mean value at the starting point); (2) Intercept variance (I_V, i.e., the inter-individual variability around the mean value at the starting point); (3) Slope mean (S_M, i.e., the average growth rate over time); (4) Slope variance (S_V, i.e., inter-individual variability around the average growth rate); and (5) the covariance between Intercept and Slope (I-S_C, i.e., the association between the starting point and the growth rate). The tested unconditional model is depicted in Figure 1.

To identify the trajectory that best captures the change of prosocial behavior, we tested the following three unconditional models: (1) a *no-growth model* or *intercept only-model* that estimates only the intercept and assumes a no-change trend over time of prosocial behavior; (2) a *linear growth model* that tests a model in which the prosocial behavior trajectory follows a linear increase or decrease across time; (3) *quadratic growth model* that tests a model in which the prosocial behavior trajectory assumes a quadratic shape with an initial increase or decrease and a subsequent rebound, decline, or stability. These unconditional models were compared using the Chi-square difference test ($\Delta\chi^2$) to identify the model that best fits our data. Finally, to explore our second and third aims referring to the effects of time-invariant predictors (i.e., HDI, gender, and family SES) on prosocial development, we tested a series of conditional models in which the growth factors (i.e., intercept and slope) were regressed on all time-invariant predictors one at a time.

We estimated parameters and handled missing data using the Maximum Likelihood estimator. To evaluate the goodness of fit of our models, we used the following indicators: Chi-square index (χ^2), Comparative-Fit-Index (CFI) and Tucker-Lewis-Index values > 0.90 as indicators of acceptable model fit, and CFI/ TLI > 0.95 as indicators of good model fit (Brown, 2015; Kelloway, 1998; Kline, 1998), as well Root-Mean-Square-Error-of-Approximation (RMSEA) with 90% Confidence Interval (CI), and Standardized-Root-Mean-Square-Residual (SRMR) values lower than 0.08 as indicators of moderate model fit and below 0.05 as an indicator of good model fit (Brown, 2015; Iacobucci, 2010). Analyses were conducted in RStudio 2024.04.1, using *lavaan* (Rosseel, 2012).

3 Results

3.1 Preliminary analyses (descriptive statistics and correlations)

As shown in Table 1, the youth's mean level of prosocial behavior slightly increases over time, suggesting a plausible age-related increase from late childhood to adolescence. Regarding correlational results, we found a moderate positive association between HDI at T1 and prosocial behavior at T1, T2, and T3, indicating that at higher levels of HDI, higher is prosocial behavior at ages 9, 10, and 13, and vice versa. Whereas the correlation between HDI at T1 and prosocial behavior at T4 was weak and negative, suggesting that higher previous levels of national life expectancy, education, and wealth are associated with a lower tendency of prosocial behavior enactment at age 16.

3.2 Alignment optimization

Following Lai (2023) procedure, we first implemented a series of longitudinal measurement invariance models (Vandenberg and Lance, 2000; Putnick and Bornstein, 2016) which had not reached the minimum level of longitudinal scalar invariance (see Supplementary material for results of the longitudinal measurement invariance). Because the configural, metric, and scalar model showed a good fit to the data, we implemented the alignment optimization that showed a good proportion of non-invariant parameters as reported by (a) $< 30\%$ (i.e., 5.40 out of 18) of the pairwise d_{MACS} larger than 0.20 (i.e., 3 out of 18: helping T1 vs. T4 $= 0.32$, T2 vs. T4 $= 0.27$, and T3 vs. T4 $= 0.24$), (b) $< 50\%$ of the items (i.e., 1.5 out of 3) had at least one $d_{MACS} \geq 0.20$ (1 out of 3, i.e., helping behavior item), and (c) the $R^2 = 0.99$. Thus, based on this alignment optimization, which showed an acceptable number of parameters that held longitudinal measurement invariance, we continued implementing a second-order growth curve model based on the alignment optimization to estimate the rate of change of prosocial behavior during the transition to adolescence.

3.3 Results of the unconditional second-order LGCM

To explore the longitudinal developmental trend of prosocial behaviors during the transition to adolescence (from ages 9 to 16 years), we tested a series of unconditional second-order LGCM: no growth, linear, and quadratic change (see the Data Analytic Approach section for further details). As reported in Table 2, the linear model was chosen over the no-growth and the quadratic models because it was the model that best represented the data.

As depicted in Figure 2 and as indicated by the positive and significant mean of the slope ($S_M = 0.04$, $p < 0.001$), prosocial behavior showed a slight increase from 9 to 16 years of age, with inter-individual variability in growth over time, as shown by the significant variance of the slope ($S_V = 0.01$, $p < 0.001$). Moreover, results showed significant variance of the intercept ($I_V = 0.67$, $p < 0.001$), attesting to inter-individual variability at the starting point (i.e., at 9 years old). Finally, the covariation between the intercept and the slope was significant and negative (I-$S_C = -0.07$, $p < 0.001$), indicating that those who started with a higher initial level of prosocial behavior at 9 years of age showed less increase of prosocial behavior over time.

10.3389/fdpys.2024.1472589

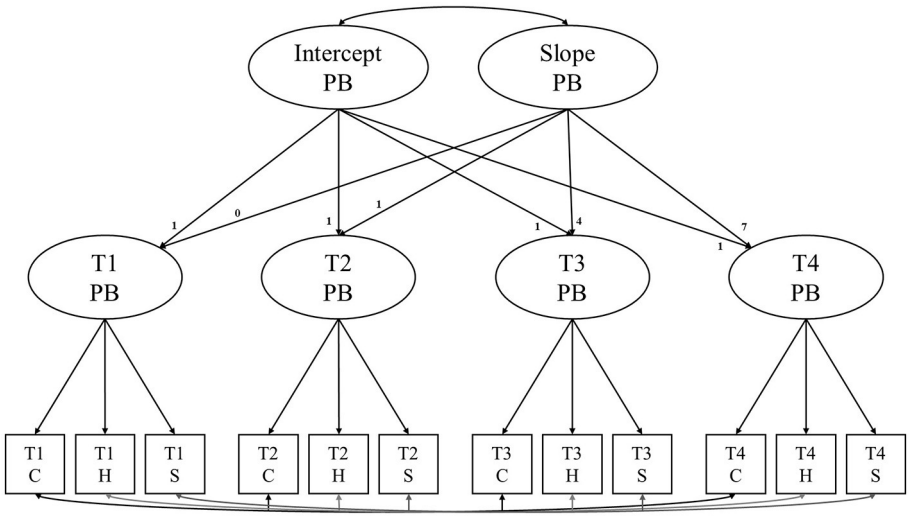

FIGURE 1
Graphical representation of the tested second-order LGCM. PB, Prosocial Behavior; T1, Time 1 (9 years); T2, Time 2 (10 years); T3, Time 3 (13 years); T4, Time 4 (16 years); C, Comforting behavior item; H, Helping behavior item; S, Sharing behavior item.

TABLE 1 Descriptive statistics and correlations for study variables.

Variables	*M*	*SD*	1	2	3	4	5	6	7	8	9
1. HDI T1	0.81	0.09	-								
2. Gender (0 = boys, 1 = girls)	0.49	0.50	−0.01	-							
3. Family income	4.54	2.79	0.27**	−0.03	-						
4. Mother's year of education	12.98	4.18	0.01	0.00	0.60**	-					
5. Father's year of education	13.17	4.12	0.01	0.02	0.56**	0.73**	-				
6. Prosocial behavior T1	2.53	0.43	0.21**	0.17**	0.12**	0.14**	0.14**	-			
7. Prosocial behavior T2	2.55	0.43	0.23**	0.15**	0.14**	0.12**	0.15**	0.43**	-		
8. Prosocial behavior T3	2.59	0.41	0.19**	0.19**	0.18**	0.10**	0.09*	0.23**	0.31**	-	
9. Prosocial behavior T4	2.60	0.43	−0.08*	0.10**	0.15**	0.15**	0.15**	0.10**	0.16**	0.26**	-

Variables 3, 4, and 5 have been used to assess Family SES. $^{*}p < 0.05$. $^{**}p < 0.01$.

3.4 Results of the conditional second-order LGCM

3.4.1 The effect of the human development index

To explore our second aim, the latent intercept and the latent slope of prosocial behavior were regressed on the HDI, which was centered on the grand mean. HDI significantly and positively predicted the intercept (b = 3.71, $p < 0.001$), indicating that higher HDI was associated with higher initial levels of prosocial behavior at T1. Moreover, the effect of the HDI on the slope of prosocial behavior was significant (b = −0.58, $p < 0.001$), supporting the moderating role of HDI in relation to the developmental trajectory of prosocial behavior during the transition to adolescence. As depicted in Figure 2, at higher levels of HDI (i.e., one *SD* above the mean), the developmental trajectory of prosocial behavior remained stable over time ($S_M = 0.01$, $p = 0.598$), whereas at lower levels of HDI (i.e., one *SD* below the mean), prosocial behavior increased ($S_M = 0.12$, $p < 0.001$) during the transition to adolescence. Given that the examination of the developmental trajectory of prosocial behavior at high and low levels of HDI displayed similar levels of prosocial behavior at T4, we also tested a model in which the starting point was moved to each time point (T2, T3, and T4) to understand whether mean-differences in prosocial behavior levels were found at each stage of development. At ages 10 (T2: b = 3.13, $p < 0.001$) and 13 (T3: b = 1.38, $p < 0.001$) years, HDI positively predicted the intercept of prosocial behavior, whereas this association did not hold at 16 years (i.e., T4; b = −0.37, $p = 0.442$), indicating that prosocial behavior levels at 16 years did not differ as a function of the HDI.

TABLE 2 Model fit indexes of the unconditional second-order LGCMs for prosocial behavior.

	χ^2	*df*	*p*	CFI	TLI	RMSEA (90%CI)	SRMR	MC	$\Delta\chi^2$	Δdf	*p*
1. No growth	86.75	38	<0.001	0.97	0.94	0.04 (0.03.05)	0.05				
2. Linear	**45.48**	**35**	**0.111**	**0.99**	**0.99**	**0.02 (0.00.04)**	**0.03**	**2 vs. 1**	**41.27**	**3**	**0.001**
3. Quadratic	45.28	34	0.094	0.99	0.99	0.02 (0.00.04)	0.03	3 vs. 2	0.20	1	0.655

The following fit indexes are reported: χ^2, chi square; *df*, degrees of freedom; $p = \chi^2$ *p*-value; CFI, Comparative-Fit-Index; TLI, Tucker-Lewis-Index; RMSEA, Root-Mean-Square-Error-of-Approximation with 90% confidence intervals (90% CI); SRMR, Standardized-Root-Mean-Square-Residual; MC, Model Comparison; $\Delta\chi^2$, chi square difference test; Δdf, degrees of freedom difference; $p = \Delta\chi^2$ *p*-value. Values in bold represent the chosen unconditional model.

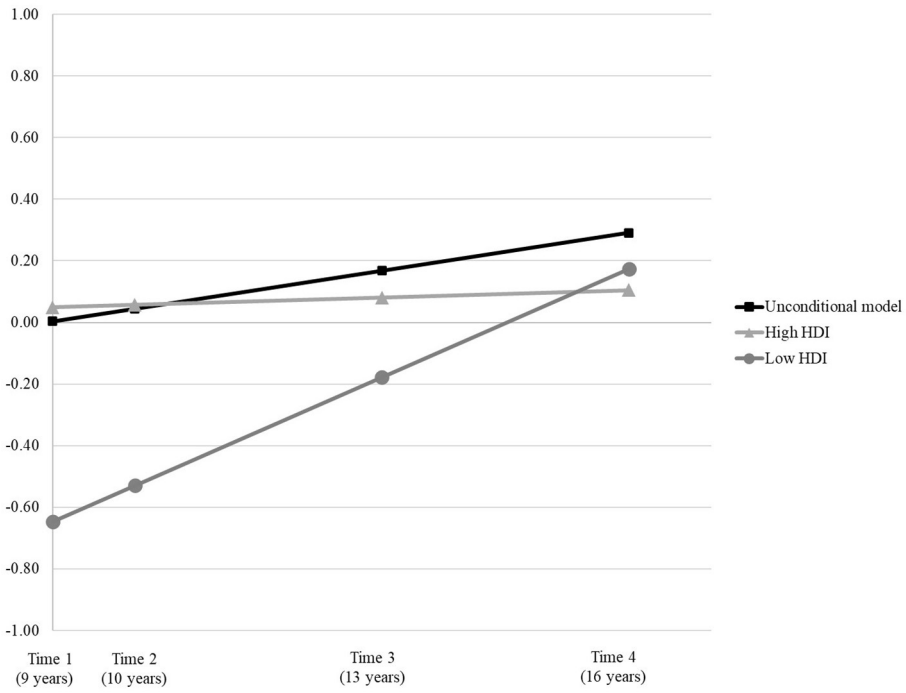

FIGURE 2
Developmental trajectories of prosocial behavior during the transition to adolescence and the moderating effect of the HDI.

3.4.2 The effects of child gender and family SES

Finally, the latent intercept and slope of prosocial behavior were regressed on the child's gender and family SES. Girls scored higher than boys at the initial level (b = 0.54, $p < 0.001$), but no significant effect were found for the slope (b = −0.03, $p = 0.054$). Higher family SES was associated with higher initial levels of prosocial behavior at 9 years (b = 0.15, $p < 0.05$), but family SES was not related to the developmental trajectory (b = −0.002, $p = 0.863$) of prosocial behavior during the transition to adolescence.

4 Discussion

The present study extended prior knowledge of the developmental trajectory of prosocial behavior during the transition to adolescence (from 9 to 16 years old) using data from six countries around the world (i.e., Colombia, Italy, Jordan, the Philippines, Thailand, and the United States). In addition, we examined whether and how countries' Human Development Index (HDI) predicted the initial levels and rates of change of adolescents' prosocial behavior. These aims were also examined while considering the role of child gender and family SES.

Overall, the results showed that prosocial behavior follows a linear increasing trend as children move to adolescence. However, when country HDI was taken into account, results indicated that for adolescents coming from contexts with higher national life expectancy, education, and wealth, prosocial behavior remains stable over time, whereas for those growing up in contexts with lower national life expectancy, education, and wealth, prosocial behavior followed an increasing trajectory.

Regarding the first aim, the average developmental trajectory of prosocial behavior during adolescence was one of increase. Although contrary to our hypothesis, our result accords with previous findings showing an increasing trend in prosocial behavior as a function of child age (Carlo et al., 2024). This result aligns with theoretical expectations stressing that as children move to adolescence and become more sophisticated in their prosocial-related skills, such as sympathy or perspective-taking, they may also enhance their capability to enact other-oriented behaviors (Spinrad and Eisenberg, 2023).

Regarding the second aim, the significant predictive role of the HDI on the initial level and rate of change of adolescents' prosocial behavior attested to a change in prosocial development as a function of the cultural context. HDI positively predicted high initial levels of prosocial behavior at child ages 9 (T1), 10 (T2), and 13 (T3), but not at age 16 (T4), meaning that living in countries with high HDI was associated with a greater tendency of enacting other-oriented behavior during late childhood and the earliest stages of adolescence but not in late adolescence. Although these results partially contradicted previous findings by the OECD (2011), one plausible explanation can be traced in the assessment of prosocial behavior. In the present study, we used a measure that reflected children's general tendency to help, comfort, and share with others, whereas previous findings focused on prosocial-related behaviors such as volunteering and donating (which are more likely if a child has leisure time and access to money or other commodities).

In regard to the trajectory of prosocial behavior during the transition to adolescence, HDI was related to variability in the trajectories of prosocial behavior. We found that, at high levels of HDI, prosocial behavior tended to remain stable, whereas at low levels of HDI, prosocial behavior significantly increased as children moved into adolescence (from ages 9 to 16). Despite the lack of previous studies concerning the longitudinal trajectories of prosocial behavior in a multicultural sample, a possible explanation for these differences can be offered.

In line with the bioecological model (Bronfenbrenner and Morris, 2007), the mechanism through which a given cultural context influences individual development depends on its dynamic interaction with the proximal environment, such as the family context. Accordingly, previous evidence indicated that the higher the HDI, the more caregivers regularly engage in socioemotional and cognitive practices with their children that, in turn, promote children's socioemotional and cognitive competences (Bornstein et al., 2022). Thus, it might be that in high-HDI societies, the experience of an early environment characterized by greater nurturing and stimulating interactions facilitates children's acquisition of a dispositional stable tendency to act prosocially that is less likely to be influenced by age-related changes and environmental factors as children move to adolescence. In contrast, in contexts with low HDI, the practices through which caregivers socialize their children to prosocial behavior and prosocial-related skills may occur later during their development. Given the systemic socioeconomic difficulties that characterize contexts with low HDI (e.g., limited access to early education, limited access to healthcare), as children approach adolescence, they are increasingly involved in everyday caring activities toward younger siblings or other family and community members (Armstrong-Carter and Telzer, 2021), thereby boosting their engagement in prosocial actions. However, considering that, to our knowledge, this is the first longitudinal study on prosocial behavior trajectories during adolescence in a multicultural sample, additional studies are needed to deepen our understanding of the interaction between HDI and prosocial development.

These differences should be interpreted cautiously for at least two reasons. First, from a methodological perspective, the inclusion of HDI as a time-invariant covariate captured a portion of the interindividual differences in the growth parameters (i.e., intercept and slope) of prosocial behavior. Thus, it might be plausible that, given that high-HDI countries showed a high initial level of prosocial behavior at child age 9, the stability of prosocial development for high-HDI societies is associated with a ceiling effect. Second, it is possible that other cultural factors (e.g., norms and values) not considered in this study may influence prosocial development. For example, a cross-sectional experimental study by Knafo et al. (2009) conducted with college students from 21 countries showed that at higher levels of cultural embeddedness (i.e., cultural orientation to the wellbeing of the extended in-group), individuals showed fewer tendencies to help strangers. However, this study also showed that, controlling for cultural embeddedness, country income (i.e., gross domestic product) contributed to explaining helping behaviors. In particular, similar to our results, countries with higher incomes were less likely to help others compared to low-income countries. Thus, despite the effect of cultural norms and values, country income has a unique role in the explanation of prosocial behavior.

Finally, in line with our hypothesis and as suggested by previous findings (van der Graaff, 2023), girls showed higher initial levels of prosocial behavior compared to boys, reflecting the possibility of greater adherence to traditional gender roles, with girls being more oriented toward nurturing and caring behaviors than boys and boys being more self-oriented than girls (van der Graaff, 2023). However, contrary to our hypothesis, adolescents with higher family SES were more likely to enact prosocial behavior compared to their peers coming from families with low SES (van der Graaff, 2023). In addition, we found that adolescents with higher family SES were more likely to enact prosocial behavior compared to their peers coming from families with low SES. Although some previous studies found that adolescents from low-SES families show greater cooperative and compassionate competencies than high-SES individuals, predisposing individuals to enact more prosocial behavior (Robinson and Piff, 2017), other studies suggest that individuals with higher socioeconomic backgrounds tend to engage more in other-oriented behaviors than their counterparts (Korndörfer et al., 2015; Andreoni et al., 2021). Based on the Family Stress Model (Conger et al., 1994; Masarik and Conger, 2017), it might be that low family SES generates daily economic pressure and higher parental psychological distress, reducing positive and warm parenting practices that, in turn, affect the development of prosocial behavior (Pastorelli et al., 2016).

4.1 Strengths and limitations

Our findings contribute to ongoing research on cultural factors and the development of prosocial behavior during adolescence and

highlight the importance of strengthening studies on adolescents' positive development across diverse populations worldwide. The present study had several strengths. First, it included a large international sample from six countries, offering insights into the majority world, which is not frequently considered in prosocial literature. Second, we adopted a longitudinal design covering four time points over 7 years, spanning the transition to adolescence, which is a sensitive developmental window in which environmental norms and personal experiences are crucial in shaping attitudes and behaviors (Steinberg and Morris, 2001; Callaghan and Corbit, 2023). Third, in line with the bioecological model (Bronfenbrenner and Morris, 2007), our results suggest the importance of considering the role of distal sociocultural factors, such as the HDI, in shaping prosocial development.

Despite these strengths, some limitations should be noted. First, the present study relied on a brief self-report measure of prosocial behavior that reflects a general tendency to help, comfort, and share with others. A growing body of studies highlights the complexity and nuances of prosocial behavior (see Eisenberg and Spinrad, 2014) related to the relationship with the recipient (e.g., toward family members, friends, or strangers; Padilla-Walker et al., 2018). For example, a cross-sectional study by de Guzman et al. (2008) revealed that Filippino adolescents enact more prosocial behavior toward relatives, whereas Australian adolescents are more inclined to orient their prosocial behaviors toward non-relatives. Thus, future studies should consider toward whom the behavior is directed to offer a more complete picture of how prosocial behavior develops across countries. Second, although the self-report allowed us to capture the unique perspective of participants' prosocial behavior over the transition to adolescence, we recommend future studies to assess prosocial behavior by using multiple sources of informants (e.g., parents, teachers, peers) to gain insight into prosocial development from different perspectives (De Los Reyes et al., 2019). Third, our measure was originally developed in a minority world country (i.e., Italy), which might fail to capture the meaning of prosocial behavior in majority world countries (Armstrong-Carter and Telzer, 2021; Draper et al., 2023). Thus, future studies might deepen the examination of the developmental trajectory of prosocial behavior during adolescence by using different measures to capture other aspects related to the variability in prosocial behavior as a function of the cultural context (e.g., family and cultural values). Fourth, although the present study used a sampling procedure that recruited socioeconomically diverse families within countries, our sample was not representative of national populations. Therefore, results may not generalize to the entire population of the six involved countries.

4.2 Conclusions and implications

Although research on the development of prosocial behavior during adolescence has prospered, several areas call for further advances. A notable gap is identifiable in the scarcity of longitudinal studies among countries of the majority world, which are underrepresented in prosocial literature. The findings of this multicultural longitudinal study attempt to partly close this gap by considering the role of sociocultural factors in relation to prosocial behavior trajectories across six countries, suggesting that the distal environment (i.e., related to life expectancy, education, and wealth at the national level) is related to how other-oriented behaviors develop as children move to adolescence. Thus, enlarging longitudinal evidence across diverse cultures and considering the role of the broad context may provide unique insights into the development of prosocial behavior and give more differentiated models for fine-grained interventions.

Data availability statement

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

Ethics statement

The study received approval from Institutional Review Boards (IRBs) at participating universities in each country. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

FC: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization. CP: Investigation, Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. CR: Investigation, Writing – review & editing, Writing – original draft. AZ: Writing – review & editing, Methodology, Formal analysis, Conceptualization. ET: Writing – review & editing, Methodology, Investigation. MG: Methodology, Writing – review & editing. LDG: Writing – review & editing, Investigation. DB: Writing – review & editing, Investigation. PO: Writing – review & editing, Investigation. ATS: Writing – review & editing, Investigation, Data curation. ES: Writing – review & editing, Investigation. LS: Writing – review & editing, Investigation. LMUT: Writing – review & editing, Investigation. SY: Writing – review & editing, Investigation. LPA: Writing – review & editing, Investigation. SMA-H: Writing – review & editing, Investigation. MHB: Writing – review & editing, Investigation. LC: Writing – review & editing, Investigation. KD-D: Writing – review & editing, Investigation. KAD: Writing – review & editing, Investigation. SG: Writing – review & editing, Investigation. DJ: Writing – review & editing, Investigation. NE: Writing – review & editing, Supervision. JEL: Writing – review & editing, Project administration, Investigation, Funding acquisition, Data curation, Conceptualization.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This research was funded by the Eunice Kennedy Shriver National

Institute of Child Health and Human Development, Bethesda, MD, United States, grant RO1-HD054805.

Conflict of interest

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

The handling Editor RF declared a shared affiliation with the author NE at the time of the review.

The author(s) declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fdpys.2024.1472589/full#supplementary-material

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