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PAPER

The development of generosity and moral cognition across five cultures

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Abstract

Morality is an evolved aspect of human nature, yet is heavily influenced by cultural environment. This developmental study adopted an integrative approach by combining measures of socioeconomic status (SES), executive function, affective sharing, empathic concern, theory of mind, and moral judgment in predicting sharing behavior in children (N = 999) from the age of 5 to 12 in five large-scale societies: Canada, China, Turkey, South Africa, and the USA. Results demonstrate that age, gender, SES, culture, and social cognitive mechanisms explain over 20% of the variance worldwide in children's resource allocation. These findings are discussed in reference to standard cultural comparisons (individualist/collectivist), as well as the degree of market integration, and highlight continuities and discontinuities in children's generosity across urban contexts.

Research highlights

- The development of generosity and moral cognition was assessed in an unprecedented sample of children (999) across five cultures (Canada, China, South Africa, Turkey and USA).
- A variety of intrinsic and extrinsic factors influencing generosity and moral cognition, including executive function, theory of mind, empathy, and SES, were measured.
- Social cognitive development, combined with basic demographics, seems to be the best predictor of moral behavior.
- Affective processes are not related to expressions of generosity.

Introduction

Humans are a hyper social species, which is to say specialized and adapted for group living. Rules and expectations for social interactions have been established and honed over our evolutionary past. Most cultures in the world have basic principles admonishing harm to others and advocating for cooperation and distributive justice. Behaviors that promote group cohesion and the smooth functioning of social interactions, arguably building blocks or precursors to moral cognition, have been documented in other species (Prétôt & Brosnan, 2015). Such behaviors include helping, sharing, cooperation, reciprocity, and inequity aversion. While prosocial behavior has traditionally been conceptualized as a global concept, recently many scholars have argued for more fine-grained analysis of the multidimensional facets of this construct (Tomasello & Vaish, 2013). Furthermore, distributive justice and generosity is interesting because it is, by nature, costly to oneself (Gurven, 2004). As early as 3 months of age, human infants express a sensitivity to the prosocial versus antisocial nature of a character (Kuhlmeier, Wynn & Bloom, 2003). By their first birthday, infants already exhibit expectations for conspecifics to be fair in their sharing compared

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to unfair (Sloane, Baillargeon & Premack, 2012). Before the third year of life, children who are quick to prefer a fair person compared to an unfair, begin to share their toys with others, translating their prosocial cognition to behavior (Schmidt & Sommerville, 2011). In North American and European children, clear differences can be observed in the development of generosity, emerging from a primarily selfish allocation at 3 years of age to more equal allocations by 8 years of age (Benenson, Pascoe & Radmore, 2007; Fehr, Bernhard & Rockenbach, 2008).

However, despite these seemingly universal foundations of moral cognition and sharing, there are significant variations across cultures (Robbins & Rochat, 2011; Sachdeva, Singh & Medin, 2011) and domain-general capacities. Findings from developmental and limited cross-cultural studies suggest that sharing behavior depends crucially on both affective and cognitive processes responsible for representing and integrating information about beliefs and outcomes (e.g. Jensen, Vaish & Schmidt, 2014). Moreover, decades of cross-cultural investigations have shown differences in moral judgment (Haidt, Koller & Dias, 1993; Wainryb, 1995), empathy (Borke, 1973), executive function, and theory of mind development (Lan, Legare, Ponitz, Li & Morrison, 2011; Sabbagh, Xu, Carlson, Moses & Lee, 2006). Taken together, there is compelling evidence that the development of sharing behavior and moral cognition varies by culture, and may also be differentially influenced by domain-general social cognitive and affective capacities, including general moral development, affective processes, executive function, and theory of mind/perspective-taking.

The study of moral development has been dominated by a focus on stage-like progression in children's reasoning regarding morality (Colby, Kohlberg, Gibbs, Lieberman, Fischer *et al.*, 1983; Turiel, 1966). The level of reasoning was assumed to predict the moral behavior of children. Yet in empirical studies, general moral reasoning has seldom been predictive of moral behavior (Blasi, 1983; Gerson & Damon, 1978). More recently, following a renewed focus on the moral reasoning–moral action relation, toddlers' evaluation of prosocial actions has been shown to predict their own sharing behavior (Schmidt & Sommerville, 2011). However, by late preschool, children's judgments of others' actions are no longer related to generosity (Smith, Blake & Harris, 2013). Moreover, developmental neuroscience studies have begun to reveal a dynamic integration between the circuits underpinning emotional processing and cognitive evaluation (Cowell & Decety, 2015b) in young children when they view and evaluate morally laden behavior (Cowell & Decety, 2015a; Decety & Michalska, 2010; Decety, Michalska & Kinzler, 2012).

The development of empathy has been linked to greater expressions of prosocial behavior in many studies; however, the relations are moderate in size, and are specific to the nature of empathic assessment (Eisenberg & Miller, 1987). There is also burgeoning work in infants and toddlers that affective processes motivate early altruistic behavior (Aknin, Hamlin & Dunn, 2012). While many studies have documented small effect sizes in the relation between empathy and prosocial behavior (Eisenberg-Berg & Lennon, 1980), recently, empathic concern and empathic distress have been shown to significantly alter children's prosocial giving behaviors in early childhood (Li, Li, Decety & Lee, 2013; Williams, O'Driscoll & Moore, 2014). Furthermore, children from different cultures exhibit differential empathic and prosocial responses, which may impact the coupling between empathy and generosity (Kärtner, Keller & Chaudhary, 2010). In sum, the role of developing empathic abilities and affective processes, generally, in expressions of generosity remains ambiguous.

Young children's lack of generosity has also been proposed to be due to an inability to inhibit their own desire for rewards and to share with others, that is, immature executive functioning (EF). EF is an early emergent domain-general capacity, arguably present in late infancy, but continuing to develop well into adolescence and early adulthood, a pattern that parallels the development of the prefrontal cortex (Zelazo & Carlson, 2012). With greater cognitive flexibility, inhibitory control, and working memory, children should become more generous. However, empirical results from two recent studies measuring aspects of executive function and sharing behavior in children found mixed results. In the first, children's inhibitory control was related to the number of candies donated, but this relation did not hold when analyses were restricted to only children who had shared any resources (Aguilar-Pardo, Martínez-Arias & Colmenares, 2013). In the second study, inhibitory control was not found to account for the difference between what children said they should share and what they actually shared (Smith *et al.*, 2013).

The lack of generosity in children has also been hypothesized to be an early developmental state, a precursor to integrating other viewpoints, and ultimately becoming generous. By middle childhood, others' subjective perspectives are integrated into considerations. As children begin to take others' perspectives, they recognize others' desires for resources as well, and will subsequently engage in sharing. In one study examining early fairness in bargaining behaviors, preschoolers with greater theory of mind abilities tended to offer more resources than those with less mature theory of mind

(Takagishi, Kameshima, Schug, Koizumi & Yamagishi, 2010). These findings suggest that adopting the perspective of another is valuable in guessing what type of sharing offer the other will accept (if the other accepts, both children receive rewards; if rejected, no one receives a reward). However, in another study with preschool-aged children, children's false-belief understanding was inversely related to sharing (Cowell, Samek, List & Decety, 2015). Indeed, preliminary relations between advanced (second-order theory of mind), but not necessarily rudimentary perspective-taking (first-order false-belief), and generosity indicate that children's advanced theory of mind development should predict greater sharing.

Historically, prosocial behavior has been studied cross-culturally using constructs in a myriad of dimensions such as industrialized versus subsistence-based economies, individualism–collectivism, Eastern–Western, etc. However, there is no agreement on how to define 'culture' and a number of cognitive anthropologists challenge such distinctions, arguing that they are inadequate (Atran, 1993). There is some evidence from cross-cultural and developmental studies indicating that this developmental pathway may be influenced by culture. Indeed, there are differences in average sharing with a peer between children of Western and Eastern cultures, with children of Eastern cultures exhibiting greater sharing than those in Western cultures (Stewart & McBride-Chang, 2000; Li *et al*., 2013). Moreover, socioeconomic status within culture also influences sharing behaviors, with some studies indicating that children from higher SES households are more altruistic (Benenson *et al*., 2007). Maternal education has been used as a proxy for socioeconomic status in hundreds of studies and a lack of maternal education has been linked to a variety of deficits in long-term social competence and health (Winkleby, Jatulis, Frank & Fortmann, 1992). Moreover, parental education has been increasingly examined in the literature, and thus far, it has provided the most accurate predictor of mother and child behavior as compared to a composite SES index (Bornstein, Hahn, Suwalsky & Haynes, 2003).

Children from rural, suburban, and urban populations often differ more within country than across country in similar environmental contexts (House, Silk, Henrich, Barrett, Scelza *et al*., 2013; Rochat *et al*., 2009). Indeed, even gender-related differences in some forms of distributive justice have been shown in particular societies, where boys and girls in Europe are equally likely to favor egalitarian distributions towards others as they age, but boys will tend to be less averse to disadvantageous inequality for an ingroup beneficiary and girls will not distinguish between ingroup and outgroup recipients when deciding aversion towards inequality (Fehr *et al*., 2008). Yet, other studies have not reported gender-related differences in children's expressions of generosity or prosocial acts (Benenson *et al*., 2007; Knafo, Zahn-Waxler, Van Hulle, Robinson & Rhee, 2008). Cross-cultural research with adult participants has also documented that large-scale, complex market-integrated societies correlate positively with prosocial behaviors and, specifically, market integration, the experience with competition and exchange is a major force in shaping cooperation in daily life (Henrich, Boyd, Bowles, Camerer, Fehr *et al*., 2005).

While cross-cultural differences between children's sharing behaviors have been documented through observational and experimental studies, no study has yet examined the underlying cognitive, emotional, and socioeconomic mechanisms guiding the development of generosity around the world. Here, a comprehensive and integrative approach was adopted to examine the development of generosity, a specific type of prosocial behavior, by combining measures of executive function, affective sharing, empathic concern, theory of mind, and moral sensitivity in a large sample of school-age children from the age of 5 to 12 across four continents in five large-scale societies. The current study includes an unprecedented range of age and number of children from multiple countries: the US, Canada, China, Turkey, and South Africa. By including samples from these countries, we significantly expand the scope of developmental research beyond what has been called the 'WEIRD people' (Western, educated, industrialized, rich and democratic; Henrich, Heine & Norenzayan, 2010). 'Weird people' represent a very narrow slice of humanity and a privileged subset of the world population. Moreover, the world is undergoing the largest wave of urban growth in history, and 60% of the world's population now lives in town and cities, and in the next two decades, this number will swell to about 5 billion. Thus, we specifically chose the five testing locations to represent the majority of the world population, urban dwellers.

The goal of the present study was to systematically explore the interplay between theorized mechanisms which underlie children's developing generosity including moral reasoning, empathic concern, affective sharing, theory of mind, and executive function in early and middle childhood across five large-scale societies. Given that precursors to prosocial behavior emerge early in development, but generosity is later developing, it was hypothesized that culture and age would influence sharing, even after accounting for socioeconomic differences between children. As gender is argued to be a relevant, but not necessarily a significant, contributor to expressions of sharing, no differences were expected. In

addition, children's domain-general cognitive abilities, such as theory of mind and executive function, were expected to positively predict generosity, as were domain-general affective socioemotional capacities such as moral reasoning, empathic concern, and affective sharing. As all testing locations were in large-scale urban societies, we anticipate similar patterns of relations and predictions of generosity for these above-mentioned variables. However, given previous literature on individualistic versus collectivist cultures, children from North America (Western, individualistic cultures) may share significantly less than children from China/Turkey (Eastern, collectivist cultures). Finally, recent studies have indicated that the size of the country's economy and degree of market integration are better predictors of cultural differences than more rudimentary dichotomies such as Eastern/Western or individualistic versus collectivist. Given this latter conceptualization, South Africa may differ from all other sites due to its relatively delayed worldwide market integration. In addition, South Africa and Turkey have the smallest economies based on gross domestic product (GDP) and as such generosity in both countries may be lower than in the other three sites that have larger economies.

Table 1 *Demographic information on children by gender and country*

Country	Age (year bin)	Males	Females
US	5–6	22	17
	7–8	33	42
	9–10	19	32
	11–12	12	13
Canada	5–6	26	30
	7–8	33	26
	9–10	33	30
	11–12	14	14
South Africa	5–6	16	17
	7–8	35	37
	9–10	21	25
	11–12	21	16
Turkey	5–6	54	34
	7–8	29	22
	9–10	15	13
	11–12	14	15
China	5–6	28	20
	7–8	15	11
	9–10	41	49
	11–12	21	34

Methods

Participants

Five- to 12-year-old children (N = 999, M age = 8.19 years, SD = 2.2 years, n = 497 females) were recruited from five large cities around the world: Chicago (USA), Toronto (Canada), Cape Town (South Africa), Istanbul (Turkey), and Guangzhou (China). For age and gender descriptives by country, see Table 1. In each country, children were recruited from public and charter schools, and individually tested in their native language by highly trained graduate and undergraduate research assistants, with oversight from the local co-investigators. All assessments occurred in an individual room either in the school or in a laboratory at each local university.

Procedure

All children completed a moral sensitivity task, an empathy task, and a sharing game, and in 70% of children (n = 706, M age = 8.06 years, SD = 2.1 years, n = 364 females) two measures of executive function (DCCS, flanker) and a first- and second-order theory of mind task were also completed; there were no differences in gender or age distribution between the sub-population and the total sample. All tasks, with the exception of the dictator game, were programmed in E-prime 2.0 and presented on ASUS^{TM} T101MT Touchscreen computers and administered in the native language of the child, in a set order: moral, empathy, Dictator, then EF and ToM counterbalanced. All tasks and questionnaires were translated from English into the native language of the child by bilingual graduate research assistants. These translations were then back-translated into English by qualified researchers, and semantic discrepancies were addressed. Parents completed demographic information, including maternal education. Written informed consent was obtained from all parents, and verbal assent was given by all children in line with ethical guidelines for testing children. All these procedures, including consent from parents and children, were approved by each local Institutional Review Board.

Measures

Children's dictator game

This tabletop, modified version of the standard dictator game is designed for children (Benenson *et al.*, 2007). In this task, children were presented a set of 30 stickers and told to choose their 10 favorite. They were then told, 'these stickers are yours to keep'. Children were instructed that the experimenter did not have the time to play this game with all of the children in the school, so not everyone would be able to receive stickers. Children were finally shown a set of envelopes and informed that

they could give some of their stickers to another child from their school who would not be able to play this game by putting them in one envelope and they could put the stickers they wanted to keep in the other envelope. Experimenters turned around during the child's choice and children were instructed to inform the experimenter when they were finished. Generosity was calculated as the number of stickers shared out of 10.

Moral sensitivity task

In this computerized task used previously with neurodevelopmental studies (Decety *et al.*, 2012), children saw a series of visual scenarios depicting interpersonal harm where faces are purposefully not shown. In each of the scenarios, one person is performing an action on another individual (pushing, shoving, bumping, etc.), either accidentally or intentionally. After seeing an animation, participants were asked two questions rated on a 7-point child friendly visual Likert scale: (A) How mean was the agent doing the action? (B) How much would your mother punish you if you did this? The order of these questions was counterbalanced, followed by a final question asking: was this action done on purpose? Judgments of the meanness of an action and judgments of deserved punishment were calculated as the mean response to each respective question across all trials (10 scenes total, 5 accidental and 5 intentional) (Range of 1–7).

Empathy task

In this computerized task, used in behavioral and functional neuroimaging studies with children (Decety, Michalska & Akitsuki, 2008), participants were shown pictures that depicted hands or feet in pain (e.g. a foot being caught in a closing door). Participants were asked to evaluate (on a visual analogue scale) how much pain they thought the person in the picture was experiencing to assess affective sharing, and how sorry they felt for that person to assess empathic concern. The order of these questions was counterbalanced. Empathic concern and affective sharing scores were calculated as the mean response (between 0 and 100) for all trials (18 trials) to each respective question.

Theory of mind task

This computerized and modified first-order theory of mind task and second-order theory of mind task progresses through three scenarios wherein two or three characters interact in various stories and children were asked questions regarding their knowledge of the actors' beliefs (Chiu Loke, Heyman, Itakura, Toriyama & Lee, 2014). The theory of mind task provides a metric of first-level theory of mind abilities (pass/fail), as well as two measures of second-level theory of mind. As our sample was 5 years of age and older, first-order false-belief understanding reached near ceiling levels, thus for variability in theory of mind abilities, a composite score was calculated from second-order false-belief understanding only. The second-order theory of mind (ToM) composite was calculated as the average of the correct responses to the false-belief questions in the two second-order scenarios. The score was then normalized using a *z*-transformation.

Dimensional change card sort task

In the computerized DCCS, children were shown a series of cards that had colored shapes on them (Zelazo, 2006). For example, children may be shown a card that has a blue boat and a red rabbit. They were then shown two target boxes: one with blue rabbits and one with red boats. The task for the child was to first sort by one (explicitly stated) dimension. After sorting by color or shape, they were then asked to sort by the opposite dimension, and finally they received a mixed block of trials that switched back and forth between sorting directions. The task increased in difficulty, progressing from single dimension blocks (all color sorting for five trials or all shape sorting for five trials), to a mixed block (30 trials). A score integrating accuracy and reaction time was calculated for each participant based on of the NIH toolbox for cognition scoring guide (Zelazo, Anderson, Richler, Wallner-Allen, Beaumont *et al.*, 2012). Each correct trial was worth a percentage of a point for a total of 5 points for accuracy. Outlier trials in reaction time were eliminated (less than 500 ms or more than 3000ms), as per the guidelines from the NIH pre-validation phase of the toolkit, and a score out of 5 was calculated for reaction time. The 5-point scores for accuracy and reaction time were added for a total out of 10. In order to compare the relative contribution of EF to developing generosity, even in the youngest children (ages 5 and 6), all children had scores out of 10 using accuracy and RT, rather than only those scoring greater than 80% in accuracy.

Children's flanker task

In this computerized flanker task, children were shown a line of fish (20 trials) or arrows (20 trials) and told to press the button that matched the way the middle fish or

arrow was pointing. Flanking fish or arrows were either congruent (in the same direction as the fish) or incongruent (in an opposing direction to the middle fish). A score integrating accuracy and reaction time was calculated for each participant based on of the NIH toolbox for cognition scoring guide (Zelazo *et al.*, 2012), using the same structure as the DCCS. A composite executive function score was calculated as the average of DCCS and Flanker scores.

Maternal education

As a metric for socioeconomic status around the world, parents were asked to specify the level of education of the mother. The scale ranged from 1: 0–5 years of total education to 6: graduate or professional degree, with a mean of 4.6 and a standard deviation of 1.24. As our sample was entirely urban, less than 1% of the population had 0–5 total years of education. The majority of this sample across the world had at least a high school education (67%).

Results

Children shared on average 3.52 stickers out of 10 (SD = 2.52). To test for potential gender, age, and culture effects, a 2 (gender) × 5 (country) × 4 (2-year age bins) Analysis of Variance (ANOVA) with generosity (amount shared) as the dependent variable was conducted. Children across cultures shared significantly differently ($F(4, 995) = 28.17$, $p < .001$, $\eta^2 = .11$), and there were significant gender differences in sharing, though this effect did not remain significant after controlling for family-wise error, using Bonferroni correction ($F(1, 998) = 26.44$, $p < .05$, $\eta^2 = .007$). Moreover, age-related changes in generosity were also significant ($F(3, 996) = 68.29$, $p < .001$, $\eta^2 = .176$) and there was a significant culture × age interaction ($F(12, 987) = 1.95$, $p < .05$, $\eta^2 = .024$). Post-hoc t-tests using Bonferonni corrections for family-wise error revealed that children in South Africa and Turkey shared significantly less than children in the US, Canada, and China and that children in China shared significantly less than children in Canada. However, children in the US and Canada did not differ significantly. The interaction between culture and age is significant, differences by age bin and culture can be found in Figure 1.

When subdividing dictator sharing into three categories: those who shared few or no resources; hoarders (3 or less, n = 454), those who shared nearly equal resources; egalitarian sharers (4, 5, 6, n = 451) and those who are 'ultra-sharers' (7 or more resources, n = 94), significant cultural differences were also found. Results from a chi-square test suggest that classification into these three groups is not equally spread across the countries, X^2 (8, N = 999)= 110.17, $p < .001$. In the US, Canada, and China, there were more egalitarian sharers than hoarders. In South Africa and Turkey, there were more hoarders than egalitarian sharers. The only countries with greater than 15 'ultra-sharers' were the US, Canada, and China. A breakdown of categorization by culture can be found in Figure 2. This pattern closely mirrors the results treating generosity continuously and

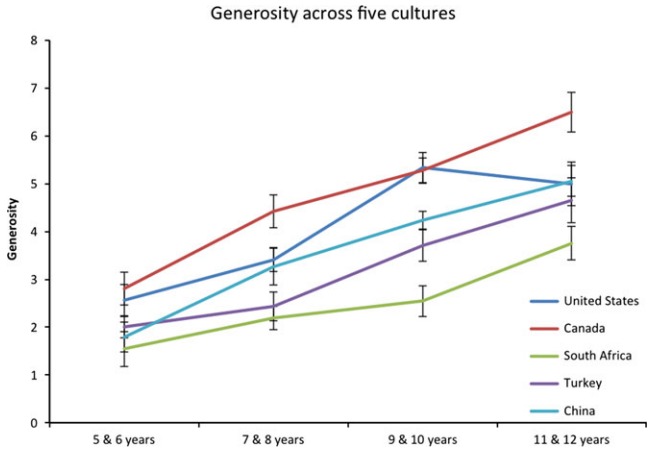

Figure 1 *Development of generosity across five large-scale cultures. Bars represents standard errors.*

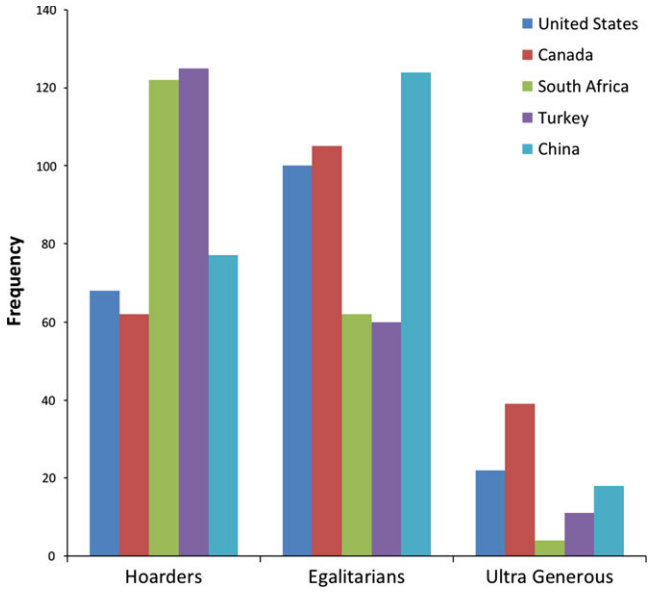

Figure 2 *Cultural differences in hoarding, egalitarianism, and ultra generosity.*

given the power limitations of examining this trichotomous sharing within each country, no further analyses were performed.

Maternal education was a small, yet a significant, predictor of sharing across all cultures ($r = .085$, $p < .05$, 95% CI: .02, .15), but did not remain significant after controlling for multiple comparisons. Across all countries (after controlling for SES differences), age-related changes were seen in executive function ($r = .48$, $p < .001$, 95% CI: .41, .54), first-order theory of mind ($r = .19$, $p < .001$, 95% CI: .11, .27), second-order theory of mind ($r = .35$, $p < .001$, 95% CI: .28, .42), judgments of meanness in moral scenarios ($r = -.26$, $p < .001$, 95% CI: −.34, −.18), and judgments of punishment in moral scenarios ($r = -.13$, $p < .005$, 95% CI: −.21, −.05).

Despite many similarities in age-related changes globally, culture-related differences were observed (after accounting for age and SES differences and correcting for family-wise error) in executive function ($F(4, 562) = 21.2$, $p < .001$; $\eta^2 = .134$), second-order theory of mind ($F(4, 562) = 20.02$, $p < .001$, $\eta^2 = .13$), judgments of meanness in moral scenarios ($F(4, 562) = 6.75$, $p < .001$, $\eta^2 = .05$), affective sharing ($F(4, 562) = 5.75$, $p < .001$; $\eta^2 = .04$), and empathic concern ($F(4, 562) = 7.09$, $p < .001$; $\eta^2 = .05$).

To examine the best model of developing sharing across the world, a hierarchical multiple regression was utilized to predict generosity in the dictator game. Facets hypothesized to influence sharing behaviors were entered into subsequent blocks. In the first block, culture (Canada, China, South Africa, Turkey, United States), child's age, gender and maternal education were entered. In the second block, social cognitive components, including a composite executive function score and second-order theory of mind, were included. In the final block, four aspects of affective components, empathic concern, affective sharing, average judgments of the meanness of the perpetrator in a moral scenario, and average judgments of the deserved third-party punishment, were integrated into the model. The first model was a significant predictor of generosity ($F(7, 559) = 32.89$, $p < .001$, $R^2 = .28$) across the world. The second model was significantly more explanatory than the original model ($F(9, 557) = 26.856$, $p < .01$), accounting for 29% of the variance in generosity (delta R^2 from first model = .01, $p < .01$). The final model was also a significant predictor of generosity ($F(13, 542) = 19.22$, $p < .001$); however, the change in fit ($R^2 = .005$, $p = .46$) from the second model was not significant. For beta weights and best model fit information, see Figure 3.

Generosity can also be assessed as a dichotomy, sharers and hoarders, by subdividing those who shared any resources ($n = 807$) from those who did not share any ($n = 192$). Results from a binary-logistic regression with hoarding/sharing as the dependent variable suggest that in addition to cultural differences, age in years ($\beta = .584$, $p < .001$), maternal education ($\beta = .273$, $p = .07$), and executive function ($\beta = .432$, $p < .001$), but not second-order theory of mind ($\beta = .460$, *ns*), are contributors to a child choosing to share over hoard resources, and that, similar to results treating generosity continuously, the

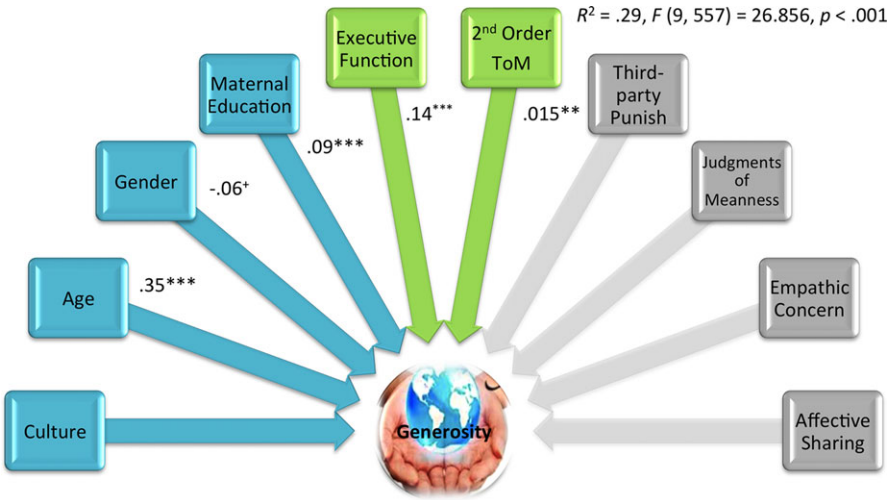

Figure 3 *Hierarchical regression model of children's generosity around the world, which illustrates how culture differentially influences moral behavior as measured by generosity. Blue represents the first entered block, demographic variables including culture, age, gender, and SES. Green represents the second entered block, social cognitive abilities including EF and theory of mind. Grey boxes represent the third entered block, variables that did not add to the model. Standardized beta weights are given next to each predictor, with significance metrics (*** p < .001; ** p < .01; * p < .05; + p < .1).*

model is significantly more predictive than a demographics-only model.

To examine the specific and differential contributions of affective and cognitive mechanisms to developing generosity, individual hierarchical multiple regression models were also conducted in each culture. The models were specified in the same way as the cross-cultural model, but no longer included culture or SES as a predictor in the first block (SES was not a predictor of generosity in any country, except China). In Canada and China, the best fit model was basic demographics and social cognitive components (model adjusted R^2 = .192, delta R^2 from original model = .026, $F(2, 187) = 6.942$, $p < .05$; model adjusted R^2 = .406, delta R^2 from original model = .038, $F(2, 105) = 19.60$, $p < .05$, respectively). Post-hoc comparisons of predicted values by model fit, comparing unstandardized predicted values and correcting for multiple comparisons using the Bonferroni method, suggest that the best model fit for China is significantly more predictive of generosity than the best fit model in Canada ($p = .019$). In Turkey and the US, the basic model (age, gender) was the best fit for predicting generosity (adjusted R^2 = .199; $F(2, 181) = 22.515$, $p < .001$), and (adjusted R^2 = .202; $F(2, 146) = 18.43$, $p < .001$), respectively, and the predicted value for the best model fits did not differ significantly between Turkey and the US. In South Africa, no model was a significant predictor of generosity in children, after correcting for family-wise error.

Discussion

The present study examined the development of generosity and morality across a diverse sample of 5- to 12-year-old children in large-scale societies around the world by integrating several measures including empathy, executive function, theory of mind, and moral sensitivity. Generosity, used as a proxy for moral and prosocial behavior, is particularly interesting as it changes with age and is influenced by several intrinsic and extrinsic factors.

As fundamental domain-general mechanisms of social cognitive development have previously been shown to vary widely by culture (Borke, 1973; Chiu Loke *et al.*, 2014; Sabbagh *et al.*, 2006), age-related and cultural differences in generosity were examined in relation to the development of more general processes. In line with our hypotheses and previous work (e.g. Rochat *et al.*, 2009), children's generosity, regardless of their cultural upbringing, was significantly influenced by age. Older children across the world shared significantly more resources with a confederate than younger children. These differences persisted after accounting for maternal education (SES) and gender. A pattern of incremental increase in sharing was evident, suggesting relative cross-cultural continuity in the shape of the expressions of generosity between 5 and 12 years.

A main effect of culture was also robustly present in a two-step fashion, wherein North American children (Canada and US) and Chinese children shared significantly more resources than their counterparts in Turkey and South Africa. This was also observed in the categorical dividing of sharing, wherein children in North America and China were more likely to be egalitarian (as compared to hoarding) in their sharing than children in Turkey and South Africa.

Contrary to some previous work, gender alone was not a significant predictor of generosity across the world. However, several studies with children of the same age, using the Dictator game and similar empathy tasks in both the US and China, have not found any gender differences (Cowell & Decety, 2015a; Decety *et al.*, 2012; Li *et al.*, 2013; Michalska, Kinzler & Decety, 2013). The best model for predicting generosity, accounting for over 20% of the variance, included basic demographic information, such as age, gender, culture, and socioeconomic status, as well as domain-general cognitive mechanisms of executive function and theory of mind (second-order ToM). Surprisingly, given that the majority of likely mechanisms underlying children's generosity, including holistic culture, age, gender, SES, EF, ToM, empathy and moral judgment, were incorporated into our model, the amount of the variance explained (29%) may be considered modest. Thus, future studies would benefit from the addition of other intrinsic and extrinsic variables such as family structure, birth order, religiousness or parenting styles.

The processes underpinning generosity are not necessarily culturally universal. Different systems play distinctive roles across cultures (Henrich *et al.*, 2005; Sachdeva *et al.*, 2011). To examine the differential component models of generosity, individual hierarchical regressions were performed in each culture. Results reveal similarities and dissimilarities in the processes that lead or influence children to be generous across our diverse sample of urban populations. A model including age and gender was the best predictor of sharing in Turkey and the United States. The addition of cognitive processes in Canada and China accounted for significantly more variance in generosity than the basic model. Interestingly, generosity could not be predicted in South Africa from any of these models. General affective processes, hypothesized to relate to social behavior including affective sharing, empathic concern, and third-party punishment, were not related to generosity

and failed to explain significantly greater variance than the demographics and cognitive mechanism model across the world and in any individual culture.

The construct of culture encompasses a wide range of shared beliefs, procedures, assumptions, tools, and norms (Triandis & Suh, 2002), but remains ill-defined. Distinctions have often been made between individualistic cultures, those represented in North America and Western Europe and collectivistic cultures, those present in large portions of Asia and Africa (Imada, Carlson & Itakura, 2013; Ji, Nisbett & Su, 2001) or industrialized versus subsidence-based economies, or Eastern vs. Western, small-scale vs. large-scale societies (de Guzman, Do & Kok, 2014). However, there are many aspects to culture beyond this, including complexity and tightness, in-group identity (Triandis, 2001), size of the economy, and degree of market integration (Henrich *et al*., 2005). In the present study, rudimentary measures of culture were included as country-based differences. Simple comparisons of individualist and collectivist cultures, or Eastern vs. Western are not necessarily the most informative in these data. In addition, as all of the countries involved belong to relatively industrialized large-scale societies, these comparisons are not explanatory in the current data set. Generosity within individualistic (Western) cultures and collectivist (Eastern) cultures was highly variable. Indeed, greater similarities between children of two individualistic cultures (Canada and the United States) and one collectivist culture (China) were present than between the two explicitly collectivist cultures (China and Turkey). Thus the comparison of individualistic versus collectivist cultures or East vs. West is not informative, as argued by Atran (1993). In keeping with a previous cross-cultural investigation of adults' economic behavior, the size of the economy (GDP) and degree and history of market integration does appear to contribute to culturally based variability in our results (Henrich *et al*., 2005). In particular, children in South Africa were less generous in comparison with other countries, and models of generosity using age, gender and other variables were not predictive of sharing behavior. Amongst our sample, it was the last to achieve world-wide market integration, with some economists arguing that this did not occur until after the end of the Apartheid (Oden, 1996). In addition, children in South Africa and Turkey shared significantly less than other countries in our sample. Both South Africa and Turkey are the smallest economies (in GDP) amongst our industrialized sample.

For nearly half a century, the role of theory of mind in the development of generosity has been debated (Iannotti, 1978). In recent investigations, children with more advanced theory of mind abilities have been more efficient in bargaining games (Takagishi *et al*., 2010). However, with a cross-cultural sample of preschool-age children, no evidence for a relation between false-belief understanding (first-order theory of mind) and generosity was found after accounting for age (Rochat *et al*., 2009). Results from the present study provide a compelling argument that aside from age, second-order theory of mind abilities are a primary driver of developing generosity in middle and late childhood (5–12-year-olds). Similar to Rochat and colleagues (2009), first-level false-belief understanding was not a predictor of generosity, yet even after controlling for age, gender, maternal education, and culture, second-order ToM was related to sharing.

Between the ages of 5 and 12, extensive development in domain-general cognitive capacities, such as theory of mind and executive function, occurs (Wellman & Liu, 2004; Zelazo, Müller, Frye, Marcovitch, Argitis *et al*., 2003). Individual differences in developing executive function and social cognition have short-term consequences including early academic success and social competence (Blair & Razza, 2007) and long-term consequences on physical health, overall socioeconomic status, and criminality in adulthood (Moffitt, Arseneault, Belsky, Dickson, Hancox *et al*., 2011). Accordingly, these general processes are often theorized to underlie development in other behaviors, such as moral judgment and sharing (Monin, Pizarro & Beer, 2007). The results from the current study suggest that this theorized notion is precisely the case. Across the world and regardless of culture, knowledge of individual differences in social cognitive abilities leads to a more complete understanding of the generous child.

Emotional processes, such as empathic concern, affective sharing, as well as aspects of moral judgment were not related to expressions of generosity. Moreover, models including these components failed to explain more variance in children's altruistic behavior. These findings add to a growing theoretical and empirical literature questioning the link between moral cognition, empathy, and actual prosocial or moral behavior (Blasi, 1983; Cowell & Decety, 2015a; Decety & Cowell, 2014; Williams *et al*., 2014). Furthermore, these results are consistent with several behavioral studies in North American children (e.g. Eisenberg-Berg & Lennon, 1980), as well as a recent developmental neuroscience study of moral evaluation and sharing in preschool children that demonstrated the importance of controlled cognitive processes, rather than automatic/affective ones, in predicting generosity (Cowell & Decety, 2015a).

All testing locations were purposely selected from large-scale societies and urban environments, which represents the majority of the world's population. As

with all large-scale cross-cultural investigations, several caveats must be considered in interpretation. While context, gender, and age were used to selectively pair in recruitment across cultures, socioeconomic matching was not possible. To account for differences in socioeconomic status, maternal education in all cultures was documented (and used as a covariate in cross-cultural comparisons). In the present sample, nearly two-thirds of the participants' mothers had at least high school education, potentially limiting the generalizability of these models to extreme poverty. Moreover, while all children were tested using the same touchscreen electronic computers, in their native language, full data for all tasks could not be collected in all participants. The present analyses account for missing data through elimination of incomplete datasets.

The results of the current study are the most comprehensive cross-cultural investigation of their kind, systematically assessing the processes underpinning developing generosity in five cultures around the world in nearly 1000 children in middle and late childhood, beyond convenience samples in North America, the predominant population in developmental studies. Taken together, these data provide compelling evidence that age, culture, and general social cognitive development (theory of mind, EF), but not general affective processes, are the best predictors of generosity across the world. Yet, an important part of the variability in children's generosity across the world remains unaccounted for with the inclusion of these variables, paving the way for many future cross-cultural investigations.

Conclusion

Overall, this study documents how both intrinsic factors and social environment are necessary to understand the development and operation of generosity. Moral behavior, here measured as generosity, is highly governed by age-related maturation across the world, but not gender or, as has been theorized for decades, affective processes. Importantly, domain-general skills, such as executive function and theory of mind abilities, promote children's sharing behavior. Yet, while many intrinsic characteristics of the child are highly predictive of generosity, cultural differences are robust. Despite the fact that all of the children tested in our study live in large-scale societies and urban environments, sizeable cultural differences were observed. Accordingly, investigation of the mechanisms that lead children to act morally need to take into account the development of social cognitive skills embedded in local environments.

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