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Brief Report

Altruistic sharing behavior in children: Role of theory of mind and inhibitory control



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ABSTRACT

This study aimed to assess altruistic sharing behavior in children aged 3 to 5, 6 to 8, and 9 to 11 years and to explore the involvement of potential cognitive mechanisms, namely theory of mind (ToM) and inhibitory control. A total of 158 children completed a dictator game with stickers as incentives. ToM was evaluated using a false belief task in preschoolers and the Strange Story Test in school-age children. Inhibitory control was assessed in preschoolers with the Day–Night task and in older children with the Stroop Color–Word Test. The result was that 48.10% of children aged 3 to 5 years decided to share, and the percentage rose significantly with increasing age. The difference in altruism level in children who decided to share among the three age groups was nonsignificant. These results suggest that mechanisms underlying the decision to share or not and altruistic behavior may be different. No significant linear relations were found between cognitive processes (i.e., ToM and inhibitory control) and sharing behavior. Surprisingly, 9- to 11-year-olds who shared 3 of 10 stickers performed worse in inhibitory control than did those who shared any other number of stickers. In conclusion, the proportion of children who decided to share, but not the level of altruism, increased with age. ToM was not involved in altruistic sharing, whereas inhibitory control may play a role when deciding how much to share.

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Introduction

Altruistic behavior, defined as any behavior that increases others' fitness at the cost of the performers' benefit, has gained increasing research interest (Fehr & Rockenbach, 2004). To investigate the development of altruism in humans, some studies have been conducted in children to observe their performance (Cortes & Dweck, 2014). However, there is no consistent conclusion about the developmental tendency of altruism in children so far. Benenson, Pascoe, and Radmore (2007) examined altruistic sharing in children aged 4, 6, and 9 years and found that older children performed more generously than younger children. Blake and Rand (2010) reported the same trend in children aged 3 to 6 years. Conversely, in other studies, no significant age effect was found (Gummerum, Hanoch, Keller, Parsons, & Hummel, 2010; Sally & Hill, 2006). In the context of these divergent results, and considering the factors that influence children's altruistic behavior (Fehr & Fischbacher, 2003), it may be helpful to examine children's pure altruism, which represents the nature of altruism, to illuminate the developmental characteristics of altruism (Rilling & Sanfey, 2011).

In addition, the mechanisms underlying altruism remain unclear. Although theory of mind (ToM) and inhibitory control are considered to be potential cognitive components that drive altruistic behavior (Warneken & Tomasello, 2009), there is no consensus for either of them. Theory of mind is the ability to understand others' mental states (Premack & Woodruff, 1978). Several experimental studies did find that ToM was positively related to altruistic sharing (Takagishi, Kameshima, Schug, Koizumi, & Yamagishi, 2010; Wu & Su, 2014), although other studies did not find the relation (Burkart & Rueth, 2013). In this study, we aimed to investigate whether ToM is involved in pure altruism.

Inhibitory control, the ability to suppress a prepotent response while pursuing a cognitively represented goal, was speculated to be required in altruism (Knoch & Nash, 2015). To the best of our knowledge, there are only two studies that examined the relation between inhibitory control and children's sharing behavior. Aguilar-Pardo, Martinez-Arias, and Colmenares (2013) found that inhibitory control could predict children's decision to share or not, whereas Smith, Blake, and Harris (2013) argued that inhibitory control could not explain the development of children's sharing behavior. Thus, in this study, we attempted to examine whether inhibitory control operates in pure altruism.

In summary, in the current study, we assessed pure altruistic sharing behavior among Chinese children aged 3 to 11 years and concurrently measured ToM and inhibitory control. As far as we know, our study is the first to attempt to do so. Our aims are to investigate the developmental characteristics of children's pure altruistic sharing and the role of ToM or inhibitory control in children's altruistic sharing.

Method

Participants

A total of 158 children participated in this study and were divided into three age groups according to their grades: preschoolers (ages 3–5 years, $M = 4.77$, $SD = 0.68$; $n = 54$, 30 girls), first through third graders (ages 6–8 years, $M = 7.28$, $SD = 0.97$; $n = 55$, 25 girls), and fourth through sixth graders (ages 9–11 years, $M = 10.30$, $SD = 0.92$; $n = 49$, 31 girls). They were recruited from a primary school and a kindergarten to participate in a social cognitive assessment project that contained an altruism test as a part of the assessment. The introduction of the project was briefed to all of the students' parents, and they signed informed consent voluntarily (see [Appendix A in online supplementary material](#)).

Materials and procedure

The detailed materials of each task are provided in [Appendix B of the supplementary material](#).

Dictator game

Pure altruism can be modeled with the dictator game (DG) (Forsythe, Horowitz, Savin, & Sefton, 1994). The dictator is given a windfall resource to allocate between himself or herself and another

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