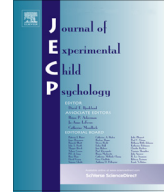




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Resource allocation to kin, friends, and strangers by 3- to 6-year-old children



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ABSTRACT

Kin altruism has been widely observed across species, including humans. However, few studies have discussed the development of kin altruism or its relationship with theory of mind. In this study, 3- to 6-year-old children allocated resources between themselves and kin, a friend, or a stranger in three allocation tasks where the allocation either incurred a cost, incurred no cost, or conferred a disadvantage. The results showed that, compared with 3- and 4-year-olds, 5- and 6-year-olds acted more altruistically toward kin and that kin altruism was uncorrelated with theory of mind. These findings suggest that, within the context of resource allocation, kin altruism emerges toward the end of early childhood and probably differs from other prosocial behavior that relies solely on the understanding of others' perspectives.

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Introduction

One of the most influential theoretical frameworks following and extending Darwin's natural selection and fitness theory (Darwin, 1859/1964), kin selection, and inclusive fitness theory (Hamilton, 1964), also explains the widespread phenomenon of kin altruism. However, the theoretical conceptualization and subsequent empirical investigations have been conducted with the adult population exclusively, with little knowledge generated on how and when kin altruism develops in

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children. There is literature on the development of altruism in children in general, especially in the context of resource allocation (Güroğlu, van den Bos, & Crone, 2014; House et al., 2013; Moore, 2009), but not regarding the development of kin altruism specifically. Whereas simply knowing the developmental time lines of human kin altruism is itself crucial, a deeper understanding of its human development should bring more insight into this species-general adaptation. For example, knowing the extent to which the development of kin altruism coincides with that of theory of mind (ToM; Premack & Woodruff, 1978) should reveal potential differences between kin altruism and other prosocial behaviors that rely solely on an understanding of others' perspectives. The purpose of the current study was to investigate the onset of kin altruism in children within the experimental paradigm of resource allocation and its relationship with ToM.

Ubiquity of kin altruism

Kin altruism is ubiquitous among nonhuman and human animals. When facing attacks from predators, nonhuman animals such as Siberian jays, prairie dogs, and capuchin monkeys issue more alarm signals when accompanied by kin than when accompanied by nonkin (Griesser & Ekman, 2004; Hoogland, 1996; Wheeler, 2008). In social activities, rhesus monkeys prefer to seek proximity with kin and groom them (Kapsalis & Berman, 1996). Japanese macaques assist their kin more than they do their nonkin when confronting antagonists (Chapais, Gauthier, Prud'Homme, & Vasey, 1997; Ventura, Majolo, Koyama, Hardie, & Schino, 2006). When asked to select between option 1/1, in which both the self and a partner received food, and option 1/0, in which only the self received food, capuchin monkeys most frequently selected option 1/1 when the partner was kin (de Waal, Leimgruber, & Greenberg, 2008). Similarly, macaques preferred option 0/1 (providing the recipient with food even though they themselves would not receive food) over 0/0 for recipients with whom they lived in a kin-like environment (Chang, Winecoff, & Platt, 2011). Chimpanzees also were more likely to cooperate with individuals with whom they developed a kin-like relationship; for instance, they were more tolerant of mistreatment from kin-like chimpanzees than from other group members (Brosnan, Schiff, & de Waal, 2005).

Kin altruism is equally or more common in human adults. In agricultural production, people are more likely to work with kin than with nonkin (Hames, 1987). In business, people trust kin and prefer to have their kin help in managing firms; more than half of the firms in the United States are family owned (Spranger, Colarelli, Dimotakis, Jacob, & Arvey, 2012). Furthermore, people leave higher proportions of estates to kin than to nonkin (Smith, Kish, & Crawford, 1987), migrant workers remit more money to their families (Bowles & Posel, 2005), and genetically related households share more food (Ziker & Schnegg, 2005). Labor, materials, and costly rescue behavior are more commonly provided to kin than to nonkin (Burnstein, Crandall, & Kitayama, 1994; Kruger, 2003; Madsen et al., 2007; Stewart-Williams, 2007). In experiments, adult participants preferred to trust kin (Vollan, 2011) and played investment games in a manner favoring partners who had kinship cues such as facial resemblance (Krupp, Debruine, & Barclay, 2008). In cooperation games, people generally treat kin more favorably than they do strangers; kin receive less punishment for transgressions and receive more compassion and help when they are mistreated (Lieberman & Linke, 2007; O'Gorman, Wilson, & Miller, 2005).

Kin selection and inclusive fitness

According to evolutionists, the aforementioned kin altruism is the result of kin selection and inclusive fitness (Hamilton, 1964). By extending the Darwinian concept of fitness, which is defined by reproductive success, or the number of surviving offspring produced, kin selection emphasizes inclusive fitness, which is the fitness, or reproductive success, of an individual plus the effects of a particular behavior or trait of the individual on the fitness of the individual's relatives. The extent of a relative's fitness to be included in an individual's fitness is appropriated by the degree of genetic relatedness between the individual and the relative. Because altruism is by definition self-disserving, it cannot be selected through the fitness of the individual carrier of the trait. Kin altruism provides one of two mechanisms by which altruism can be selected and promulgated in a population, with the

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