



## The relationship between birth order and prosociality: An evolutionary perspective



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### ABSTRACT

Much of the research on birth order has focused on individual differences in personality traits, with relatively few studies focused on aspects of social behavior other than sibling conflict. However, one would predict that the differences in parental investment and niche differentiation that shape personality differences between siblings would also influence other social relationships. In particular, middleborns may be more likely to prioritize non-kin relationships. This study investigated the impact of birth order on a number of measures of prosocial behavior. Results suggest that birth order has a moderate effect on prosociality such that later birth orders exhibit greater prosociality. However, both the linear and quadratic effects were significant and the quadratic was negative indicating that the greatest increase in prosociality is seen between first and secondborns, the rate of change decelerates as birth order and prosociality increase.

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### 1. Introduction

Much research in psychology focuses on the antisocial side of behavior, on violence and competition. But as a number of researchers note (Krebs, 2015; Kurzban, Burton-Chellew, & West, 2015), a substantial amount of prosocial behavior is necessary for such social group living species as humans and an increasing volume of research has focused on examining the adaptations that enable such behavior. In fact, prosocial behavior is a large part of our everyday lives from simple tasks such as holding doors open to volunteering at shelters for homeless animals or people to more costly behaviors such as rescuing others trapped by fire or flood. Just as those who research antisocial behavior are interested in explaining individual variation in such behavior, an important question for those interested in prosocial behavior is “what variables affect the probability of people behaving in prosocial ways” (Krebs, 2015). In addition, other than observing prosocial behavior or placing individuals in experimental settings to test their altruistic tendencies, what survey style measures do we have that might map onto a factor that we would call prosociality?

#### 1.1. Group and individual level variations in prosociality

Substantial variation in levels of cooperative behavior has been documented across societies (House et al., 2013; Marlowe & Berbesque, 2008), including the documentation of an association between the cultural presence of deities concerned with moral behavior and large group

size (Norenzayan & Shariff, 2008) as well as large group size more generally being associated with such behaviors as “altruistic” punishment. However, there is also interpersonal and intrapersonal variation in prosocial behavior within societies. In economic studies of monetary allocation in dictator games, there can be a great deal of interpersonal variation with some individuals giving nothing and others giving half or more of their money. Baldassarri and Grossman (2013) suggest that there are “two social-structural dimensions along which people’s generosity varies systematically: group attachment and social position” with greater group attachment increasing prosocial behavior and that having a formal position within the group increases generosity toward group members.

Taking into account the costs and benefits of prosocial acts, we would expect that individuals would be “naturally disposed to help those with whom they share fitness interdependence” (Krebs, 2015) which explains prosocial behavior in general toward kin and members of one’s social group with the emotional bonds between them perhaps serving as part of the mechanism for directing helpful behavior. Haley and Fessler (2005) have suggested that some prosocial behavior is designed to play a role in reputation formation based on experimental results that indicate that cues of being observed increase levels of generosity in economic games. Here prosocial behavior is a way of advertising that you would be a good social exchange partner and member of your group. Shariff and Norenzayan (2007) found similar effects in terms of increasing prosocial behavior with cues of observation by a deity. However, these approaches are not focused on explaining prosocial variation between individuals, rather they are either targeting variation within individuals across situations or examining the role of reputation/observation in encouraging altruistic behavior or other situational variables (Rao et al., 2011).

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So are there individual traits that might be associated with prosocial behavior? Krebs (2015) notes that there is a connection between empathy and altruism in that we tend to help those we empathize with, which can certainly be related to the connection between groups and prosocial behavior. Some research has also indicated that there may be birth order differences in empathy (Kalliopuska, 1984; Stotland, Sherman, & Shaver, 1971; Sulloway, 2001) and altruism (Courtiol, Raymond, & Faurie, 2009) that could play a role in prosocial behavior.

### 1.2. Birth order, parental investment, and niche picking

Birth order, defined as an individual's rank by age among their siblings, has long been of interest as an environmental factor influencing a variety of traits from intelligence (Black, Devereux, & Salvanes, 2011; Kristensen & Bjerkedal, 2007) to sexual orientation (Bogaert & Skorska, 2011; VanderLaan & Vaset, 2011). Why birth order would influence such dramatically different traits can be seen in birth order differences in parental investment and in differences in niches.

Parental investment (Trivers, 1974) is any investment that a parent makes that increases the likelihood of that offspring's survival and reproduction at the cost of that parent's ability to invest in other offspring (either current siblings or future ones). This can be anything from providing food and shelter to attention, education and other financial support. Of course, parents and their children may disagree on where the optimal allocation of those resources lies. The relevance of birth order to parental investment is largely related to age of offspring and age of the mother. An offspring's expected contribution to parental fitness rests mainly in their reproductive value which increases with age until puberty, making older immature offspring more valuable from a parental fitness perspective than younger ones (Daly & Wilson, 1988). It is this assurance of parental favoritism (and the lack of early competitors) that makes firstborn children defenders of parental values and the status quo while laterborns are more likely rebellious. However, lastborns may also get some special benefit from being the last one born, the last opportunity to invest and from being born to older mothers all else being equal. This may account for the quadratic birth order effects that are sometimes found when examining aspects of investment such as money provided for college tuition (Kennedy, 1989).

Sulloway (2001) suggested that children adopt different roles or niches within the family and that specialization of roles within the family, like specialization of species in the wild (such as Darwin's finches) reduces levels of sibling competition. This differentiation makes siblings unique from each other in a number of ways. Eldest siblings often occupy the role of surrogate parent with its responsibilities and adherence to rules. For laterborn children, there is no advantage to trying to duplicate the same role as firsts, they need to find their own niche and their openness to experience with less adherence to rules and authority facilitates this (Healey & Ellis, 2007; Sulloway, 1999). A majority of past research on birth order differences has focused on personality traits (mostly the big five) and has not always produced consistent results (Salmon, 2012), though examinations of the facets within the big five factors are illuminating in that some of the component facets trend in contrary directions (for example, the nurturance versus dominance aspects of extraversion and agreeableness; see MacDonald, Patch, & Figueredo, 2016). Behavioral studies have produced more consistent patterns of results (Sulloway & Zweigenhaft, 2010). While firstborns focus more on the family (Pollet & Nettle, 2007; Rohde et al., 2003; Salmon & Daly, 1998), laterborns often turn their focus outward to friends and other exchange partners, enabled by their prosocial tendencies in building support more broadly (Rohde et al., 2003; Salmon & Schumann, 2011).

### 1.3. Birth order's connection to prosocial behavior

Sulloway and others (Sulloway, 1996; Salmon & Daly, 1998; Salmon 2003) have suggested that the favoring of firstborns (due to their greater reproductive value) and lastborns (due to older parents and lack of

younger rivals) means that middleborns are the birth order that loses out on average in the parental investment game. As a result, they seem to focus more on developing non-kin reciprocal relationships outside the family unit (Salmon, 2003) and their personality traits seem to be a reflection of that. Laterborns generally tend to score higher in terms of agreeableness and the prosocial aspects of extraversion (Paulhus, Chen, & Trapnell, 1999; Sulloway, 1995).

Evidence of birth order differences in prosociality has been collected in various ways. Miller and Maruyama (1976) report on birth order differences in friendship and play measures in grade-school children with laterborns being more popular than firstborns. Teachers also rated laterborns as possessing greater social skills than their firstborn peers (Miller & Maruyama, 1976). Fehr, Bernhard, and Rockenbach (2008) assessed egalitarianism in young children by having them play prosocial, envy, and sharing games. In this case, lastborns (those without younger siblings) were the least likely to share. A study of gift-giving behavior in Norway (Mysterud, Drevon, & Slagsvold, 2006) examined who gifts were given to and their value. While firstborns spent more on kin, middleborn children gave more to their friends than did first or lastborns which parallels Salmon's (1998) study of political speech showing that terms of friendship solidarity were more motivating for middleborns than terms of kinship.

Laterborns in general, are also more trusting and reciprocate more in experimental economic games compared to firstborns (Courtiol, Ramond, & Faurie, 2009). Studies on empathy have suggested that middleborns score higher on empathy than firstborns (Kalliopuska, 1984) while others have reported firstborns as being less empathetic than laterborns (Stotland et al., 1971).

In this study, we examined the relationship between birth order and the factor of prosociality with the prediction that being a middle child would be associated with greater levels of prosociality.

## 2. Methods

### 2.1. Participants

Participants included 220 female undergraduates at a southwestern university who received course credit in return for completing the questionnaires; however only 188 participants provided sufficiently complete data for the present analysis. The mean age was 18.6 years ( $SD \pm 2.13$ ), 95% of the participants were heterosexual, and 59.1% were single with 36.4% in a live-in relationship. The majority (79.1%) grew up in middle to upper middle class homes and 79.1% also grew up living with both parents. The birth order composition was as follows: 48.6% were firstborns, 17.7% were middleborns, and 33.6% were lastborns.

### 2.2. Procedures

Respondents completed a series of questionnaires that were used to construct our prosociality factor consisting of the Arizona Life History Battery (ALHB), the Behavioral Regulation scales from the Behavior Rating Inventory of Executive Function (BRIEF-A), two measures of Female Intrasexual Competitiveness: The Female Intrasexual Competitiveness for Status Scale and the Female Intrasexual Competitiveness for Mates scale, as well as a measure of emotional intelligence (TEIQue), uncontrolled impulsivity, and the General Factor of Personality.

### 2.3. Measures

The Arizona Life History Battery (ALHB; Figueredo, 2007) is a battery of cognitive and behavioral indicators of life history strategy. These self-report psychometric indicators measure graded individual differences along various complementary facets of a coherent and coordinated life history strategy, as specified by Life History Theory, and converge upon

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