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## Perceived parental favoritism, closeness to kin, and the rebel of the family The effects of birth order and sex

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### Abstract

We tested various predictions based on Sulloway's [*Born to rebel: birth order, family dynamics, and creative lives*. New York: Pantheon, 1996] theory of family relations, using questionnaires completed by 2024 participants from Austria, Germany, Israel, Norway, Russia, and Spain, each of whom had at least one sibling. The parents' most favored child tended to be the lastborn sibling. The rebel of the family tended to be a laterborn, and rebels tended to feel less close to their parents. In sibships of two, firstborns named a parent as the person to whom they were closest more often than did lastborns; in sibships of three or more, middleborns were the least likely to name their mother, but were more likely than firstborns and lastborns to name their father or a sibling. However, these quadratic effects on closeness to parents occurred only in sibships in which mothers were relatively old at the time of participant's birth. Sex differences, but not birth order differences, were found in the tendency to choose parents for emotional support, with women scoring higher than men. Our study demonstrates the robustness of birth order differences in samples from diverse countries and emphasizes that these

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differences may occur only in interaction with moderating variables, such as mother's age at participant's birth.

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## 1. Introduction

Since Sulloway's (1996) *Born to Rebel*, discussion of the role of birth order in the development of individual differences has gained new impetus, after it had been nearly silenced by the critical review by Ernst and Angst (1983) (see also Schooler, 1972). Based on more than a thousand studies, these authors had concluded that birth order plays little, if any, role in personality development; but researchers had shown surprisingly little interest in studying birth order effects in personality in the very setting in which they must originate, namely, the family. If birth order plays no role within the family, there would be no reason to expect it to play any role in personality development or in behavior more generally. Why then should we expect siblings of a given family to differ from one another, and in what ways? These questions are about family dynamics, and it thus seems advisable to redirect the research focus to the family, and to sharpen this focus with an explicitly articulated theoretical perspective.

An important theoretical tool for analysis of family dynamics is Trivers's (1974) model of parent–offspring conflict, which is linked to sibling rivalry (Mock & Parker, 1997), because the conflict involves a triangular dynamic between at least one caring parent, an offspring, and its future sibling. In humans, parent–offspring conflict is believed to have been an important selective force (Daly & Wilson, 1990; Haig, 1992; Sulloway, 1996, 2001), assuming its species-specific dynamic as a consequence of the fact that each mother (aided by the father and kin) usually cares simultaneously for several dependent offspring who have been born in succession, and who therefore differ in age, size, strength, and general development. According to Sulloway (1996, 1999, 2001), siblings compete for parental favor, using strategies that match their birth-rank-related capabilities and relative power. The final choice and success of each individual's strategies depend on those of its siblings, as well as on the parents' reactions to these strategies, and the dynamic thus set in motion eventually leads to the formation of relatively stable individual "family niches." Of all the individual variables that contribute to the shaping of such family niches, birth rank (from first to last child) and birth order (firstborns, middleborns, lastborns) are among the most important in predicting an individual's family niche. Other important determinants of family niches include gender roles and genetic differences in temperament and ability (Sulloway, 1996, 2001).

Both parent-driven and sibling-driven processes have been proposed as causes of niche differentiation (Sulloway, 1996, 2001). Parent-driven processes, which generally involve differential parental investment and often entail a relative neglect of middleborns, tend to reveal themselves via quadratic (or U-shaped) trends whenever data are coded in terms of

first-, middle-, and lastborns. By contrast, sibling-driven processes are expected to produce predominantly linear birth order trends, because of its age-related differences in mental and physical development that largely drive the process of niche partitioning, which is associated with the establishment of dominance hierarchies. Zigzag trends by birth rank, reflecting both parent-driven and sibling-driven processes, may also be expected in personality and social attitudes associated with niche partitioning, as we will discuss later. In this study, we concentrate on predominantly parent-driven birth order differences by asking questions that tap the relationship quality between participants and their family members.

Parental favoritism is potentially adaptive whenever offspring are not identical, and parents may be expected to modulate investment according to cues of eventual offspring fitness, which may include sex, age, and general health, as well as aspects of the developmental environment such as the availability of food and other critical resources. Offspring are expected to attempt to increase their relative fitness, not only through sibling competition, but also through niche partitioning, which helps to reduce unnecessary competition.

One way to assess the outcome of this process of niche partitioning is to assess relationship quality among family members. In humans, dyadic relationships are perceived to differ in general quality and closeness (Daly, Salmon, & Wilson, 1997; Euler, Hoier, & Rohde, 2001), and relationship quality is presumably determined partly by the history of transactions within the dyad, including parental investment in the case of parent and offspring (Daly, McConnell, & Glugosh, 1996). Our assumption here is that birth order differences in children's relationships to their parents and siblings ought to reflect the dynamics of differential parental care and/or sibling competition. In this study, our measures of relationship quality are (1) parental favoritism, (2) rejection of parental authority by becoming the family rebel, (3) closeness to different categories of kin, and (4) seeking of emotional support after a distressing experience.

Our predictions about birth order differences in parent–child relationships are based on three determinants of differential parental care. First, the child's reproductive value (Fisher, 1930), which is largely determined by age and by the resources already invested by the parents, must be considered. Firstborns generally rank highest here. Secondly, one needs to consider vulnerability and neediness, and in this, lastborns rank highest. Thirdly, the mother's residual reproductive potential plays an important role, with the trade-off between current and future reproduction ever more tipped towards current reproduction as the chances of future reproduction decline (Pärt, Gustafsson, & Moreno, 1992; Williams, 1966); in humans, a higher level of maternal motivation on the part of older mothers is predicted to enhance the overall level of maternal care and to direct that care selectively toward younger offspring who are generally the most dependent on parental care for their survival.

Our predictions for parent–child relationship quality (indexed by two measures: closest person and person sought after for emotional comfort) were as follows. For sibships of two, firstborns should be more likely to feel closest to a parent. For sibships of three or more, middleborns should feel least close to parents, because they do not generally rank high on either reproductive value or neediness (Kennedy, 1989; Kidwell, 1981; Kobayashi, Hasegawa, Hiraiwa-Hasegawa, & Kurashima, 2001; Salmon & Daly, 1998; Sulloway,

1996, p. 305). We further predicted that the strength of this effect would be moderated by the mother's residual reproductive value and hence her age on the basis of the results of Salmon and Daly (1998), who divided their participants into two groups according to the mother's age at the participant's birth, and we found that the tendency of firstborns and lastborns to name their mother as closest person more often than middleborns occurred only in those who had older mothers. However, cell counts in this study were relatively low (20 on the average), so a replication with a larger sample seemed desirable. A further and related prediction is that although the mother will be the favored parent of all children, middleborns (particularly secondborns) will tend to feel closer to the father or to a sibling as a consequence of their disadvantaged (and hence displaced) position within the sibship. With respect to parental favoritism, it is difficult to make predictions for sibships of two, because reproductive value favors the elder and neediness favors the younger; but for larger sibships, the prediction is that middleborns will be least favored, as Sulloway (2001) has found in self-report data from a sample of more than 2000 subjects.

Another way to assess family niches is to ask who is "the rebel of the family" (Kobayashi et al., 2001; Paulhus, Chen, & Trapnell, 1999). Niche partitioning leads to differences in the tendency to comply with family values (Sulloway, 1996). Which sibling becomes the most rebellious may be a matter of both differential parental care (see above) and "sibling deidentification" (Schachter, 1982), motivated by the desire to acquire unique identities. The hypothesized function of deidentification is that it reduces adverse parental comparison to older siblings in shared skill domains, and also serves to promote adaptive diversification (Sulloway, 1996, pp. 96–99, 105–108); it can produce zigzag trends from oldest to youngest child (Sulloway, 1996, 2001), but these zigzag effects are not expected to be nearly as large as birth order effects. One way of deidentifying with parents and siblings is to become the family rebel, and if firstborns are most likely to identify with parental values, they should be least likely to assume the rebel role. In sibships of three, middleborns should be the most likely to rebel, because of the combined effects of reduced parental care and sibling deidentification (Sulloway, 2001), although, empirically, they have often been found to be similar to lastborns (Sulloway, 1996). Our prediction partly deviates from that of two earlier studies (Kobayashi et al., 2001; Paulhus et al., 1999), in which firstborns were contrasted with laterborns without considering the special family niche occupied by middle children.

Finally, we tested the hypothesis that women will feel closer to kin than men do. Using various measures, several studies have reported such a difference (e.g., Oates & Wilson, 2002; Rossi & Rossi, 1990; Salmon, 1999; Salmon & Daly, 1996; Szydluk, 1995), although there is some counterevidence (e.g., Chagnon, 1988). A plausible explanation is that women are more strongly involved in parental care and seek the assistance of other kin, primarily women, in this activity (e.g., Euler et al., 2001). Salmon and Daly (1998) used the question about the closest person (described above) to test for sex differences in closeness to kin. Although there were no overall sex differences in closeness to kin among participants who nominated a relative, women more often nominated their mothers and men their siblings. Using the same question, we looked at possible sex differences in participants' relations to kin in general and to parents in particular.

## 2. Methods

We tested our hypotheses on a multinational convenience sample of university students from Austria, Germany, Israel, Norway, Russia, and Spain. The data were collected between autumn 1998 and spring 2001. The first author (P.A.R.) distributed a common reference questionnaire in English to the coworkers, who then translated the questions into their local languages. The German-language questionnaire was the same for Germany and Austria. In Section 3, we report which countries were involved in answering each particular research question.

We selected two items from Salmon and Daly (1998): (1) Whom of all the people you know are you closest to? and (2) a “witnessing of a car accident” scenario, in which subjects were to imagine and then report to whom they would turn for emotional support. Initially, in the German sample, answers were open-ended, but participants often named more than one category of persons, or an inclusive one like “parents” or “family,” so we switched to a fixed option format with eight options (mother, father, older sibling, younger sibling, other relative, a female friend, a male friend, and romantic partner), which was then used for the greater part of the German sample and for all other samples. We also asked participants, following Paulhus et al. (1999), whether they thought that they or a sibling was the most favored child, and which child was the rebel of the family.

Demographic variables recorded were sex, age, pairing status, socioeconomic class of the family (on a nine-point scale ranging from “lower lowest class” to “uppermost upper class,” not collected, however, in the German sample), and country of birth. Only participants born in the respective country are included in the analysis because long distance and long-term separation from family among foreign students or emigrants might affect their “closest” person responses. Participants older than 30 years were also excluded from the analysis in order to match the age distribution to that of the Canadian study (Salmon & Daly, 1998). Age, country of birth, pairing status, and social class served as control variables in our analysis of the total sample. We also asked for mother’s age at birth of participant and whether the participants had grown up in an intact family environment, that is, with both parents and all full siblings up to age 10. Participants for whom this was not the case (due to parents’ divorce, loss of a parent, etc.) were excluded. Finally, we asked the participants the sex and age of all their siblings and which were step-, half-, and adopted siblings. Twins and people with no full siblings, as well as those with an age difference of more than 8 years between themselves and a next younger or next older sibling, were excluded from the analysis.

Questionnaires were administered to university students of diverse fields in the countries of Germany, Israel, Norway, Russia, Spain, and Austria. These questionnaires were distributed to students during university courses and lectures (Israel, Germany, Norway, Russia, and Spain) or to individual participants recruited on a university campus (Austria). The return rate in the first case was estimated at around 90%. After applying the exclusion criteria above, the final total sample used in the analysis is displayed in Table 1.

Table 1

Sample description: numbers of participants by birth order and country

Country	Firstborns	Middleborns	Lastborns	All birth orders
Austria	125	41	129	295
Germany	209	42	149	400
Israel	97	74	62	233
Norway	223	82	193	497
Russia	77	14	50	141
Spain	215	71	172	458
All countries	945	324	755	2024
(%)	(47)	(16)	(37)	(100)

### 2.1. Statistical procedures

All dependent variables were coded into binary data (mothers vs. nonmothers, parents vs. nonparents, mothers vs. fathers, rebels vs. nonrebels, and so forth) so that all statistical hypotheses were tested by the means of bivariate crosstable analyses. As measures of effect size, we report relative frequencies and the phi coefficient of contingency (one degree of freedom). All tests of our main hypotheses were also calculated using multiple regression in which age, sibship size, pairing status, and countries (dummy coded for each nationality) were entered as control variables and birth order was entered as the independent variable. This multiple regression procedure served to (1) test for influences of the control variables on the effect size of the independent variable (birth order or sex) and (2) in sibships of three or more, compare effects in different birth order hypotheses, which were represented by different contrasts: a linear contrast (firstborns > middleborns > lastborns), a quadratic contrast (firstborns = lastborns < middleborns), and so forth. These comparisons confirmed that the contrast that best fitted the data in the bivariate analysis also had the best fit when control variables were also considered. Furthermore, it turned out that the effect sizes obtained by multiple regression (partial correlation coefficients) and by chi-square tests of  $2 \times 2$  crosstables (phi coefficients), respectively, were nearly the same, so that in Section 3, we report the results of bivariate analyses only. The dependent variable in the multiple regressions was always binary (e.g., parents vs. nonparents), which generally mandates the use of logistic regression rather than multiple regression. However, Cox and Snell (1989) found that a multiple regression yields nearly identical results to logistic regression unless the ratio of the two categories is skewed beyond a ratio of 10:90. In none of our regression analyses was such a strong skew found.

In the multiple regression analyses, sibship size (which is only relevant in analyses of sibships of three or more) never emerged as a significant variable in any of the models. Other variables that sometimes reached significance were country dummies, age (only in the closeness question), and pairing status. As these variables served as control variables only and had no apparent impact on the effect of birth order, we do not report partial correlation coefficients in Section 3. Only results involving sex as a significant control variable are reported.

All the following tests of birth order hypotheses were done separately for sibships of two and of three or more. In order to arrive at meaningful phi coefficients, which entail one degree of freedom (Rosenthal, Rosnow, & Rubin, 2000), the finding of a quadratic trend in sibships of three or more justifies pooling the data of two birth orders into a single category and comparing it with the remaining category in a  $2 \times 2$  analysis with a binary dependent variable. Analyses were carried out using SPSS 10.3 for Windows.

### 3. Results

The mean ages of the three birth order groups (in years  $\pm$  S.D.) were slightly, but significantly, different with middleborns being the oldest (firstborns:  $21.3 \pm 2.3$ , middleborns:  $21.8 \pm 2.5$ , lastborns:  $21.5 \pm 2.5$ ) [Kruskal–Wallis,  $\chi^2(2, N=2024)=11.85, P=.003$ ]. Because the sample sizes for individual countries are generally too low to allow for meaningful hypothesis testing, we refrained from cross-national comparisons. Only in the case of closeness to parents do we provide a qualitative comparison (see below).

#### 3.1. Birth order and perceived parental favoritism

Data from Israel, Norway, Russia, and Spain are available for this analysis. Participants indicated whether they considered themselves or a sibling as the child most favored by the parents. In sibships of two, we examined first whether there was an effect of the birth order of the judge on the birth order of the alleged favored child: 163 of 291 firstborns (56%) said that their younger sibling was favored, and 112 of 213 lastborns (53%) named themselves, so firstborns and lastborns did not disagree in their judgement that laterborns tend to be favored [ $\chi^2(1, n=504)=0.58, P=.44, \phi=-.03$ ]. We next determined the proportions of favored firstborns and lastborns independently of the judge's birth order. Of the 291 firstborns, 128 (44%) considered themselves as being favored, whereas of the 213 lastborns, 112 (53%) named themselves as the favored child—a nearly significant difference [ $\chi^2(1, n=504)=3.64, P=.06, \phi=-.09$ ].

In sibships of three, 45 of 127 firstborns (35%), 32 of 100 middleborns (32%), and 58 of 118 lastborns (49%) identified themselves as the favored child, disconfirming our prediction of a quadratic trend. If firstborns and middleborns are pooled, lastborns were significantly more likely to consider themselves favored (49%) than nonlastborns (34%) [ $\chi^2(1, n=345)=7.56, P<.006, \phi=-.15$ ].

#### 3.2. Birth order and rebelliousness

Data from four countries (Israel, Norway, Russia, and Spain) are available for this analysis. In sibships of two, 189 of 338 firstborns (56%) chose their younger sibling as “the rebel”, and 163 of 264 lastborns (62%) chose themselves. These opinions did not differ [ $\chi^2(1, n=602)=2.07, P=.15, \phi=.06$ ]: Firstborns and lastborns tended to agree that lastborns are the rebels of the family. We next determined the proportions of firstborn and lastborn

rebels independently of the judge's birth order. We found that of the 338 firstborns, 149 (41%) considered themselves to be the rebel of the family, whereas of the 264 lastborns, 163 (62%) considered themselves to be the family rebel [ $\chi^2(1, n=602)=18.52, P<.001, \phi=-.18$ ].

In sibships of three, when we considered only whether a participant designated him- or herself the rebel rather than one of the siblings, the percentages indicated a difference between firstborns and laterborns: 51 of 172 firstborns (30%) called themselves the rebel compared to 47 of 124 middleborns (38%), and 51 of 138 lastborns (37%). When middleborns and lastborns are pooled, 98 of 262 laterborns (37%) called themselves the rebel vs. 51 of 172 firstborns (30%)—a nonsignificant trend in the expected direction [ $\chi^2(1, n=434)=2.77, P=.10, \phi=-.08$ ].

### 3.3. Birth order and closeness to kin and nonkin

Data from all six countries were used in these analyses. Table 2 displays for each country the percentage of participants in each birth order who named a parent as the closest person. In sibships of two, 419 of the 518 participants who named a parent as closest person named the mother (81%), 95 (18%) named the father, and 4 (1%) named both parents. Consistent with our prediction, of the 574 firstborns, 307 (53%) named a parent as the closest person compared to 211 (45%) of the 467 lastborns [ $\chi^2(1, n=1041)=7.10, P=.008, \phi=.08$ ].

Table 2  
Closeness to parents by birth order and country ( $N=1941$ )

Country	Firstborns	Middleborns	Lastborns
<i>Two siblings</i>			
Austria	42 (79)	—	44 (79)
Germany	48 (139)	—	42 (114)
Israel	77 (13)	—	64 (11)
Norway	55 (131)	—	47 (123)
Russia	67 (58)	—	64 (44)
Spain	56 (154)	—	37 (96)
Totals	53 (574)	—	45 (467)
<i>Three or more siblings</i>			
Austria	47 (38)	32 (37)	52 (42)
Germany	40 (65)	36 (42)	46 (28)
Israel	56 (70)	54 (67)	56 (39)
Norway	51 (86)	41 (81)	46 (65)
Russia	65 (17)	64 (14)	60 (5)
Spain	62 (58)	41 (70)	40 (76)
Totals	52 (334)	43 (311)	47 (255)

The main table entries are the percentages of participants who named a parent as closest person. Numbers in parentheses are the counts for each birth order, including participants who named a parent and those who did not.



In sibships of three or more, 174 of 334 firstborns (52%), 134 of 311 middleborns (43%), and 120 of 255 lastborns (47%) named a parent. To test the prediction that middleborns are least likely to name parents, we pooled firstborns and lastborns, giving 134 of 311 middleborns (43%) vs. 294 of 589 nonmiddleborns (50%), a marginally significant contrast [ $\chi^2(1, n=900)=3.80, P=.05, \phi=-.07$ ].

We next tested for a possible moderating effect of mothers' age at participants' birth on the relationship between birth order and closeness to mother. Among our participants from sibships of three or more children ( $n=884$ ), 33% named their mother as the closest person. Following Salmon and Daly (1998), we divided the sample at the median age of mothers at the time of the participant's birth (27 years for mothers of sibships of two as well as for sibships of three) to create two groups. As predicted, the quadratic birth order effect on closeness to mother was found only among participants with older mothers (Fig. 1). Overall, birth order differences in family sentiment seem to be strongly moderated by mother's age at participant's birth, replicating Salmon and Daly (1998). This effect seems to be a result of both lesser closeness in middleborns and greater closeness in nonmiddleborns (see Fig. 1).

We next tested the hypothesis that children who lose out in the competition for closeness to the primary subject of attachment, the mother, would turn to their fathers instead. In sibships of two, no birth order difference in the naming of mother vs. father was found. In sibships of three or more, a nonsignificant quadratic trend emerged in which middleborns showed a

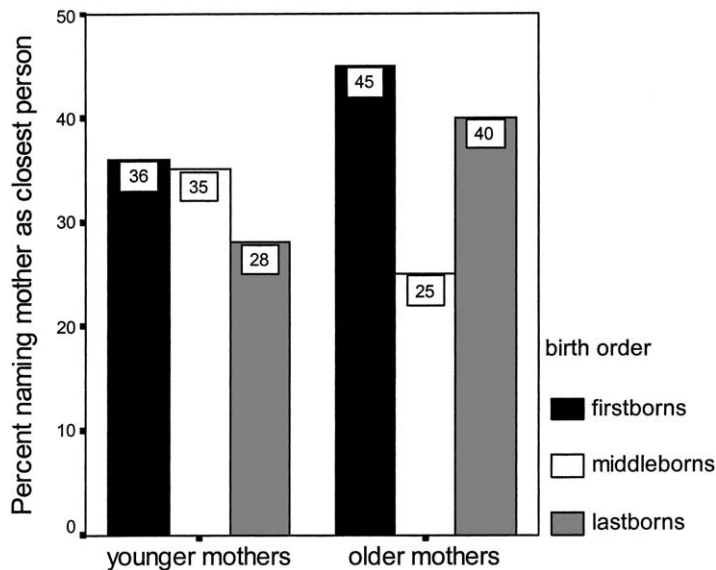


Fig. 1. Relationship between closeness to mother, participant's birth order, and mothers' age at participant's birth in sibships of three or more ( $N=884$ ). Shown are the percentages with which the three birth order categories named their mother as closest person. (Residuals contain all other person categories.) A quadratic birth order effect was found only among participants of older mothers [ $\chi^2(1, n=435)=11.95, P=.001, \phi=-.17$ ]. Age groups of mothers (younger, older) were divided at the median (27 years). Subsample sizes (by mother's age group, younger/older) are firstborns: 258/71; middleborns: 144/164; and lastborns: 47/200.

stronger preference for the father: 41 of 134 middleborns named the father as the closest person (31%), vs. 71 of 292 nonmiddleborns (24%) [ $\chi^2(1, n=426)=1.87, P=.17, \phi=.07$ ]. There was also evidence for a moderating effect of mother’s age at participant’s birth, such that the stronger preference of middleborns for their fathers occurred only among participants in the older mothers group: 34% of 62 middleborns named their father as closest person vs. only 19% of 138 nonmiddleborns (Fig. 2). No such quadratic trend was apparent in the younger mothers group [ $\chi^2(1, n=221)=0.03, P=.86, \phi=.01$ ] (Fig. 2). It would seem that under conditions of increased sibling competition for closeness to the mother, middleborns are most likely to shift away from their mothers and towards their fathers. This result parallels findings about “split-parent identifications” reported by Schachter (1982).

We further predicted a birth order difference in closest-person preference for relatives other than parents. In sibships of two, the response within the category of nonparent relatives was a sibling in 90% of the 157 cases in which such a choice was made. Lastborns ( $n=468$ ) were more likely to name their older sibling as the closest person (17%) than were firstborns ( $n=574, 11%$ ) to name their younger sibling [ $\chi^2(1, n=1044)=8.80, P=.03, \phi=-.09$ ]. In sibships of three or more, the nonparent relative was a sibling in 136 (93%) of the 147 cases in which such a choice was made; middleborns ( $n=311$ ) named nonparent relatives more often (21%) than did firstborns ( $n=334, 12%$ ) and lastborns ( $n=255, 18%$ ); pooling firstborns and lastborns, middleborns were significantly more likely to name a nonparent

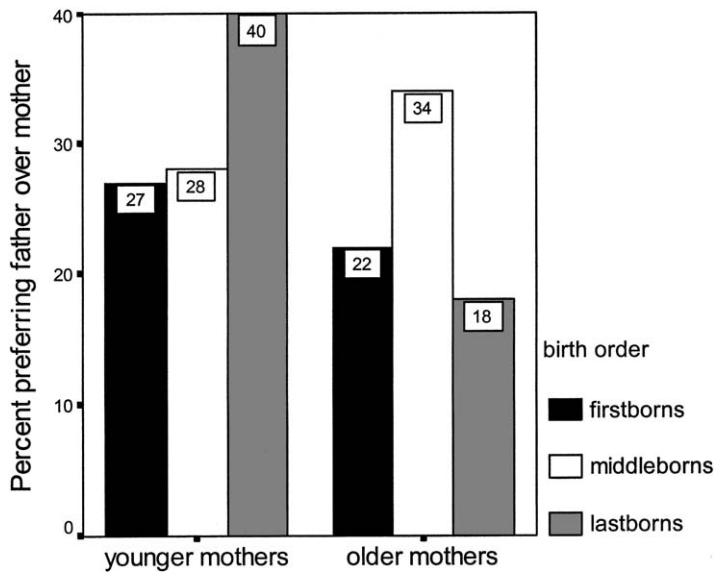


Fig. 2. Relationship between participants’ preference of father over mother, their birth order, and mothers’ age at participant’s birth in sibships of three or more ( $N=421$ ). Shown are the percentages with which the three birth orders preferred their father (bars) over their mother (residuals) as closest person. Birth order differences are found only among participants of older mothers [ $\chi^2(1, n=200)=5.38, P=.02, \phi=.16$ ]. Age groups of mothers (younger, older) were divided at the median (27 years). Subsample sizes (by mother’s age group, younger/older) are firstborns: 128/41; middleborns: 71/62; and lastborns: 22/97.

relative (21%) than were nonmiddleborns (14%) [ $\chi^2(1, n=900)=5.57, P=.02, \phi=.08$ ]. Of the 60 middleborns who chose a sibling, 38 (63%) chose an older sibling, 22 (37%) a younger sibling. This difference was nearly significantly different from the expected proportion of 50%,  $P=.05$ , binomial test.

There were no birth order differences in the likelihood of naming a nonrelative in sibships of any size. In contrast to Salmon and Daly's (1998) results, our middleborns were no more likely to name nonkin than were (pooled) firstborns or lastborns [ $\chi^2(1, n=900)=0.04, P=.80, \phi=.01$ ]. It would seem that middleborns compensate for their lack of closeness to parents by attaching to other relatives, mainly siblings.

### 3.4. *Rebelliousness and closeness to parents*

Based on our findings on family sentiment and birth order, one would expect that being the rebel of the family would be associated with reduced closeness to parents. In sibships of two, this expectation is confirmed: Of 306 subjects who called themselves the rebel, 141 (46%) chose a parent as closest person compared to 187 (60%) of the 309 self-designated nonrebels [ $\chi^2(1, n=615)=12.88, P<.001, \phi=-.15$ ]. This finding confirms the hypothesis that the status of being the rebel of the family is connected with a lower level of family sentiment.

### 3.5. *Sex differences in closeness to kin*

We next tested the hypothesis that women would be more likely than men to name kin as the closest person. This hypothesis was clearly disconfirmed: Of the 1198 women, 769 (64%) named kin as did 484 (65%) of the 744 men [ $\chi^2(1, n=1942)=0.15, P=.67, \phi=-.01$ ]. Analyses of the subsamples from the six nationalities (not possible in the case of Russia because of too few cases in one cell) yielded the same result. We next replicated an analysis from Salmon and Daly (1998) who found that, among participants who had named a relative as the closest person, women were more likely than men to name their mother. In our sample, this sex difference was significant [ $\chi^2(1, n=1253)=4.76, P=.03, \phi=.06$ ], but with a much smaller effect size than in Salmon and Daly's ( $\phi=.23$ ): 469 of 769 women (61%) named their mother compared to 265 of 484 men (55%). Correspondingly, among participants who had named a relative as the closest person, men ( $n=484$ ) named their father significantly more often (98, 20%) compared to 109 (14%) of 769 women [ $\chi^2(1, n=1253)=7.95, P=.005, \phi=-.08$ ]. When we restricted the analysis to participants who had named a parent, the results showed a general preference of the mother over the father, along with a tendency to feel closer to the same-sex parent. Of 578 women, 469 (81%) named their mother rather than their father compared to 265 (73%) of 363 men [ $\chi^2(1, n=941)=8.61, P=.003, \phi=.10$ ]. Thus, independent of birth order and sibship size, participants tended to feel closer to the same-sex parent.

### 3.6. *Emotional support after a distressing experience*

Data from Germany, Israel, Norway, Russia, and Spain are available for this analysis. Participants often chose the same person category in response to the closeness question and

the emotional support question: Of 1639 participants who responded to both questions, 58% named a parent and 64% named a relative in both cases.

In sibships of two, there were no birth order differences in response to the question about emotional support after a stressful experience [ $\chi^2(1, n = 885) = 0.93, P = .33, \phi = .03$ ]. However, there was a significant effect of sex: women ( $n = 578$ ) were more likely to turn to their parents (48%) than were men ( $n = 307, 35%$ ) [ $\chi^2(1, 885) = 13.23, P < .001, \phi = .12$ ]. In sibships of three or more, only 75 of 216 lastborns (35%) named parents compared to 123 of 292 (42%) firstborns and 114 of 273 (42%) middleborns. The contrast between lastborns and nonlastborns was close to significance [ $\chi^2(1, n = 781) = 3.40, P = .07, \phi = -.07$ ]. As in sibships of two, the same effect for sex appeared here, too [ $\chi^2(1, n = 781) = 5.12, P = .02, \phi = .08$ ].

### 3.7. Birth order and university attendance

We now report a finding that was not within the main focus of the study, but that deserves mention. Various studies have found a link between academic success and birth order (see Davis, 1997; Ernst & Angst, 1983, pp. 29–69; Sulloway, 1996; Zajonc, 2001). In our study, participants of different birth orders are not equally likely to be university students and thus to appear in our sample. Because we collected our data at universities and the return rates are estimated to have been high (>90%), we were able to compare the expected with the observed frequencies of our sample. In sibships of two, the expected proportion of firstborns and lastborns is 0.50; in sibships of three, firstborns, middleborns, and lastborns are expected to be represented equally with proportions of 0.33. For both sibship sizes, the observed birth orders deviate significantly from the expected values. Among subject from sibships of two, 55% of the participants were firstborns, 45% were lastborns [ $\chi^2(1, n = 1078) = 10.81, P = .001$ ]. Among subjects from sibships of three, 264 (42%) were firstborns, 173 (27%) were middleborns, and 198 (31%) were lastborns [ $\chi^2(2, n = 635) = 20.89, P < .001$ ]. Among these university students, firstborns are overrepresented, and there is also a slight quadratic component, with middleborns being the most underrepresented group. These birth order differences could be the result of differences in intelligence, academic ability, or motivation, or could be caused by sibling deidentification, or by parental depletion of resources used for the education of the firstborn child (Hertwig, Davis, & Sulloway, 2002; Kennedy, 1989; Zajonc, 2001). The data do not allow us to test these alternative explanations.

## 4. Discussion

Overall, we were able to demonstrate several birth order effects in the context of family relations. As predicted, the rebel of the family was more likely to be the lastborn in sibships of two, but contrary to prediction, middleborns in sibships of three were no more rebellious than lastborns. Paulhus et al. (1999) and Kobayashi et al. (2001) found a similar trend, and in Sulloway's (1996) study of scientific revolutions, too, linear trends were the rule. In our study, self-designated rebels also tended to feel less close to their parents than

nonrebels. This finding is noteworthy because it demonstrates that self-reports of status as a family rebel, which some might argue reflect only sibling stereotypes and not real personality differences, are nevertheless significantly correlated with reports of emotional bonds within the family.

Contrary to prediction, perceived parental favoritism was not lowest for middleborns, who did not differ significantly from firstborns on this measure. In contrast, lastborns in sibships of two and three children were most often rated to be the most favored child. Our results are similar to those of earlier studies on differential parental treatment where it was found that parents (usually the mothers) are more responsive, verbal, and emotionally expressive with their younger than with their older children (e.g., Brody & Stoneman, 1994; Kennedy, 1989).

Most hypotheses concerning perceived closeness in parent–child dyads were confirmed: In sibships of two, firstborns tended to feel closer to their parents than did lastborns. In sibships of three children or more, middleborns named a parent less often than did firstborns or lastborns, and they were the birth order group most likely to name a sibling. However, as in the Canadian sample studied by Salmon and Daly (1998), middleborns were different from other siblings in closeness to mothers only when their mothers were relatively old at the time of participants' birth. Also, middleborns tended to turn from mothers to fathers under these conditions. These findings are consistent with the view that mothers of low residual reproductive potential tend to increase their maternal investment in youngest children (particularly lastborns), thereby enhancing the contrast effect between middleborns and nonmiddleborns. However, alternative explanations should be considered before this explanation can be fully accepted. For example, women may reproduce at an older age as a consequence of an extended educational career. If these women are more likely to work than are younger, less educated women, they may provide less overall parental care to their children and perhaps in the process enhance the contrast effect between middleborns and nonmiddleborns.

Recently, an alternative hypothesis has been offered to explain why middleborns tend to feel less close to their parents than do firstborns and lastborns (Hertwig et al., 2002). This hypothesis assumes that parental care is completely egalitarian, but middleborns are nevertheless relatively neglected as a result of being the only children who never enjoy a period of exclusive parental attention. This may be so, but this explanation is independent of any expected birth order differences owing to the mother's age at participant's birth. Hence, quadratic trends in birth order effects involving closeness to parents may reflect multiple processes.

The hypothesis that women would be closer to kin than men was not supported. Instead, we found that both sexes were slightly more likely to feel closer to the same-sex parent than to the opposite-sex parent. An overall sex difference was found, however, in the preferred person category for emotional support after a distressing event, where women more often indicated that they would turn to kin. These results may be interpreted to mean that it is not so much the closeness to kin per se, but rather the quality of the relationship to kin and perhaps feelings of vulnerability that differ between the sexes. Further research is needed to settle this issue.

Our study was primarily concerned with within-family processes as measured by birth order and sex differences in family roles. The emerging patterns seem to reflect the outcome of dynamic interactions among family members over time. In some of the analyses of sibships comprising three or more children, we found quadratic trends, which are likely to be indicative of processes driven by parents rather than by siblings (Sulloway, 2001). The finding of quadratic effects in this and other studies has two implications. First, the dichotomizing distinction between firstborns and laterborns that is frequently employed in birth order studies on personality (e.g., Davis, 1997; Freese, Powell, & Steelman, 1999) may often be misleading (Sampson, 1965). If birth order differences in family niches are indeed at the root of birth order differences in personality, both should display the same linear and quadratic trends, as recent evidence suggests they do (Sulloway, 1996, 2001). It would thus be valuable to further explore the extent to which the (often quadratic) patterns inherent in sibling strategies and family niches are congruent with those found in birth order studies of personality. Second, the existence of quadratic birth order effects limits the likelihood that intrauterine developmental processes are a major cause of birth order effects (Beer & Horn, 2000; but see Hopkins & Dahl, 2000), although these processes surely deserve more attention for their own sake (Blanchard, 2001) and in order to make them distinguishable from processes acting on the level of social interactions. At the moment, we know of no viable hypotheses which link the quality of family relationships to the quality of the prenatal environment; these influences appear to be acting independently of one another.

A short note on effect sizes seems appropriate. Our phi coefficients typically ranged around .10 and would thus be considered negligible by those researchers who rely on Cohen's (1988) categorization of effect sizes into "small," "medium," and "large" and by those who routinely use the variance explained ( $r^2$ ) as an index of effect size. However, as Rosenthal et al. (2000) have repeatedly warned, this common statistical predilection promotes neglect of effects of considerable practical importance. For example, a first-born–lastborn difference of  $\phi = .10$  is equivalent to lastborns scoring 1.22 times higher than firstborns on a given measure (the relative risk ratio), and it is also equivalent to lastborns being 1.49 times more likely than firstborns to score in the upper half of the distribution (the odds ratio). Such effects are hardly negligible.

To summarize, with our multinational sample, we were able to test and confirm some basic hypotheses about birth order and sex differences in family relations. With regard to the ongoing debate on the reality and significance of birth order effects, the available data allow us to conclude that at least in the within-family arena, such effects are robust and generally in good agreement with Sulloway's (1996, 2001) theory of family dynamics.

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