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Birth Order in a Contemporary Sample of Gay Men

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The birth order of a contemporary North American sample of 97 gay men was quantified using Slater's Index. For the 84 probands with at least one sibling, the results showed a late mean birth order compared with the expected value of .50. Additional birth order indices derived from Slater's Index suggested that the mean later birth order was accounted for more strongly by the proband's number of older brothers than by his number of older sisters. The present findings constitute a replication of a series of recent studies and add to the growing body of evidence that birth order is a reliable correlate of sexual orientation in males.

KEY WORDS: birth order; sex ratio; sexual orientation; homosexuality; males.

INTRODUCTION

Identification of correlates of sexual orientation provides possible clues regarding its origins and genesis. Perhaps the most consistent and reliable correlate of sexual orientation pertains to patterns of childhood sex-typed behavior. On average, both gay men and lesbians recall more cross-gender behavior in childhood than do heterosexual men and women (e.g., Bailey and Zucker, 1995; Bell *et al*.,

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1981) and one controlled, prospective study of very feminine boys provides convergent evidence for this association (Green, 1987).

Since the early 1990s, a second variable—birth order—has emerged as a reliable and consistent correlate of sexual orientation in men, but not in women (for review, see Blanchard, 1997). Based on several samples of gay men studied by the second and third authors, gay men were found to be born later in their sibships than heterosexual men (Blanchard and Bogaert, 1996a,b; Blanchard and Zucker, 1994; Blanchard *et al*., 1998; Zucker and Blanchard, 1994), thus replicating two earlier studies by Slater (1962) and Hare and Moran (1979). Following these reports, there have been three independent replications by other investigators (Bailey *et al*., 1999; Bogaert, 1998; Fedoroff *et al*., 1999). Moreover, four other studies have reported a similar finding of a later birth order in transsexual men with a homosexual sexual orientation (Blanchard and Sheridan, 1992; Blanchard *et al*., 1996; Green, 2000; Tsoi *et al*., 1977). In some samples that were large enough, it was discerned that the birth-order effect is largely in relation to one's brothers, and not sisters, which Blanchard (1997) characterized as a *fraternal* birth order effect (for review, see Jones and Blanchard, 1998).

Given the erratic history of replication research on topics pertaining to sexual orientation and its possible precursors (see Byne and Parsons, 1993), the present study examined birth order in a fresh contemporary sample of gay men, originally recruited by Purcell (1995) and evaluated with regard to a variety of adjustment-related topics. Information on the subjects' birth orders had been obtained in the original study, although it had not previously been analyzed.

METHOD

Subjects

The participants were 97 gay men (*M* age, 33.5 yrs; $SD = 7.2$; range, 19–51) whose mean year of birth was 1959.8 ($SD = 7.2$; range, 1942–1974). They were recruited in several ways: after receiving a letter sent to the mailing list of the gay, lesbian, and bisexual organization at a private university in the southeastern United States (42%); newspaper advertisements in two general circulation newspapers (21%); an ad in a weekly newspaper oriented to a gay readership (5%); a radio story based on the newspaper ad (4%); and from friendship networks of prior participants (28%). Regarding ethnicity, 92% were Caucasian and the remainder were of various ethnic minorities. Overall, the participants were well educated: 21% had attended some college (or were in college) and 76% had completed at least an undergraduate college degree.

Sexual orientation of the participants was self-rated in two ways: (1) on the 7-point Kinsey scale with regard to a "lifetime" appraisal, in which 0 = exclusively heterosexual and 6 = exclusively homosexual (Kinsey *et al*., 1948) and (2) on a

continuous scale asking about percentage of current same-sex and opposite-sex fantasies. The participants were also asked to classify their current sexual identity. On the Kinsey scale, self-rating of sexual orientation was as follows: 38% were a "6," 55% were a "5," and 7% were a "4." Regarding current sexual fantasies, 98.4% were directed toward other men and 1.6% were directed toward women. Self-designation of sexual identity was as follows: 96% were gay or homosexual; 3% were "bisexual, but mostly gay"; and 1% was "bisexual, equally gay and straight."

Measures

The participants recorded on a form their numbers of older brothers, older sisters, younger brothers, and younger sisters. Maternal half-siblings were included, but paternal half-siblings were not. Several biodemographic variables were calculated from the foregoing data. The variable, sibling sex ratio, is the ratio of brothers to sisters reported collectively by a given group of probands. In white populations, the ratio of male live births to female live births is close to 106:100 (Chahnazarian, 1988; James, 1987). The ratio of brothers to sisters reported by any group of persons drawn at random from the general population should therefore approach 106 (brothers per 100 sisters). It should be noted that the calculation of the sibling sex ratio does not include the proband himself. In the computation of inferential statistics, the sibling sex ratio is more conveniently expressed as the proportion of males rather than the ratio of males to females—that is, .5146 (106/206).

Birth order was quantified using the birth-order index introduced by Slater (1958, 1962). Slater's Index equals the proband's number of older siblings divided by his total number of siblings. This index cannot be calculated for only children; for all other individuals, regardless of their number of siblings, it expresses birth order as a quantity between 0 and 1, where 0 corresponds to firstborn and 1 corresponds to last born. In a hypothetical stable population, the expected value of Slater's Index for samples drawn at random would be .50, and one can determine whether some group's birth order is significantly early or late by comparing its mean on Slater's Index with this theoretic value.

Birth orders relative to brothers and relative to sisters were calculated separately using indices derived from Slater's Index (Jones and Blanchard, 1998). The fraternal birth order index equalled the proband's number of older brothers divided by his total number of brothers. Similarly, the sororal birth-order index was calculated as the proband's number of older sisters divided by his total number of sisters.

It is important to be clear on the distinction between sibling sex ratio and fraternal birth order. *Sibling sex ratio* concerns a proband's number of brothers compared with his number of sisters; *fraternal birth order* concerns his number of older brothers compared with his number of younger brothers. The two parameters

can vary independently. A man who has a low fraternal birth order (e.g., no older brothers and two younger brothers) might have either a high sibling sex ratio (no sisters) or a low sibling sex ratio (five sisters).

RESULTS

The probands had 101 brothers and 79 sisters. This equals a sibling sex ratio of 128:100, or a proportion of .5611. The observed proportion of brothers was compared with the expected proportion (.5146) using the *z* approximation to the binomial test. The result was not significant ($p = .12$, one-tailed), which is not surprising because of the large sample requirements to achieve adequate statistical power for this measure (Moore and Gledhill, 1988; Suarez and Przybeck, 1980).

On Slater's Index, the mean birth order of the 84 probands was .63 ($SD = .41$). This differed significantly from the expected value of .50, $t(83) = 2.81$, $p = .003$, one-tailed, thus indicating that these men had a higher (later) than expected birth order.

The next phase of the analysis was examining the fraternal and sororal birth order indices in order to determine whether the high birth order of the subjects was driven primarily by older brothers. For reasons previously explained by Jones and Blanchard (1998), we restricted this analysis to those 37 subjects who had at least one brother and at least one sister. The mean sororal index was .53 ($SD = .50$), whereas the mean fraternal index was .61 ($SD = .47$), showing that those subjects who had siblings of both sexes were born later among their brothers than they were among their sisters. The fraternal index did not differ from the expected value of .50, $t(36) = 1.47$, $p = .08$, one-tailed. The sororal index also did not differ from the expected vale of .50, $t(36) = 0.33$, $p = .37$, one-tailed.

Because of prior research indicating that birth order effects are seen more clearly in larger families and that this can be achieved by weighting cases according to family size (Blanchard *et al*., 1995; Zucker *et al*., 1997), we weighted each case (*not* score) by the quantity, $s \times (37/94)$, where *s* was the total number of siblings for that case and 37/94 (the number of probands divided by the number of siblings) was a constant required to bring the degrees of freedom back to their original value. In the weighted sample, the mean fraternal index was .63 ($SD = .45$), and the mean sororal index was .55 ($SD = .49$). The fraternal index was significantly greater than .50, $t(36) = 1.76$, $p = .04$, one-tailed; but the mean sororal index was not, $t(36) = 0.66$, $p = .26$, one-tailed.

DISCUSSION

The results showed that gay men tend to be born late in their sibships and also showed that this phenomenon primarily reflects a higher than expected number of

older brothers. In the behavioral sciences in which the field is littered with new and exciting "findings" that subsequently proved chimerical, there is almost no such thing as too much replication. The present findings, therefore, represent a further addition to the cumulative evidence regarding the fraternal birth order of gay men.

This study did not include a heterosexual comparison group, and this aspect of its methodology necessitates some further discussion. If one is drawing probands at random from a population that is neither increasing nor decreasing in total size or in average family size, then one would have an equal probability of selecting subjects who are early-born, middle-born, or late-born within their individual sibships. The average proband, in other words, would have an equal number of older and younger siblings. In this circumstance, as previously indicated, the expected value of Slater's Index for samples drawn at random is .50, and one can determine whether some group's birth order is significantly early or late by comparing its mean on Slater's Index with this theoretic value.

Several theorists and researchers have shown, however, that the probabilities of selecting early-, middle-, and late-born probands are altered in complex ways when total population size or average family size or both are changing during the years when a sample of probands is being born (Berglin, 1982; Birtchnell, 1971; Cobb, 1914; Hare and Price, 1969, 1974; Jagers, 1982; Price and Hare, 1969). The extent and even direction in which the expected birth order of a given group of probands will be shifted by such demographic factors is, in practice, incalculable, although it has been argued that this can, in principle, be done (Berglin, 1982, 1985). For this reason, the expected value of Slater's Index may depart from .50, and thus the *p* values from one-sample tests comparing observed data with this theoretical mean may be inaccurate.

There are two reasons why the present findings may still be regarded as valid, despite the foregoing problem. The first is that the available empirical evidence indicates that one-sample tests comparing the observed mean score of homosexual men with a theoretical mean of .50 would tend to be, if anything, too *conservative*. Blanchard (1997) presented the mean Slater's Index for 12 heterosexual control samples totaling 4866 subjects. The mean Slater's Index for one sample was .50; for the other 11 samples it was less than .50, and in most cases substantially less. The data therefore suggest that an assumed mean of .50 may be too high for one-sample tests involving gay men recruited during the 20th century.

The second reason is even more important. Perturbations in the expected birth order produced by secular changes in the number of total births, family size, and so on, would affect fraternal and sororal birth order equally. Such demographic factors cannot explain a differential shift in fraternal birth order, as was found in the present study. In summary, these considerations, especially the latter, argue that the present findings represent a genuine confirmation of conclusions derived from studies with heterosexual control groups.

In light of the apparent reliability of the fraternal birth order effect, some serious explanatory work is in order. The most highly articulated biologic theory of this phenomenon was advanced by Blanchard and Bogaert (1996a). It was conjectured that the high fraternal birth order of gay men may reflect a maternal immune reaction, which is provoked only by male fetuses, and which becomes stronger after each pregnancy with a male fetus. This hypothesis was based partly on the argument that a woman's immune system would appear the biologic system most capable of "remembering" the number of male (but not female) fetuses that she has previously carried and of progressively altering its response to the next fetus according to the current tally of preceding males. It should be stressed that Blanchard and Bogaert (1996a) did not hypothesize that maternal immune reactions are the only, or the most important, cause of homosexuality in men. Blanchard and Bogaert (1996a) further theorized that the relevant fetal antigen might be one of the male-specific, Y-linked, minor histocompatibility antigens, often referred to collectively as the *H-Y antigen*. Various lines of indirect evidence supporting the hypothesis that maternal antibodies to H-Y might influence sexual orientation have been summarized by Blanchard and Klassen (1997).

The most popular psychosocial explanation of the fraternal birth-order effect is the hypothesis that sexual interaction with older males increases a boy's probability of developing a homosexual orientation, and that a boy's chances of engaging in such interactions increase in proportion to his number of older brothers (Jones and Blanchard, 1998). Although this hypothesis may seem intuitively plausible—at least to some people—there are little empirical data to recommend it. In the first place, correlations between same-sex sexual experiences in childhood and homosexuality in adulthood represent very weak evidence. Such correlations might mean that sexual experiences with older boys can cause a younger boy to develop a permanent homosexual orientation, but they can just as easily mean that a prehomosexual boy (whose orientation was already determined in utero) is simply more interested in, or less averse to, sexual interaction with other males. A similar point was made by Gebhard *et al*. (1965, pp. 329, 457).

In the second place, a high birth order has been demonstrated in a large sample of probably prehomosexual boys with a mean age of only 8.46 years (Blanchard *et al*., 1995). It seems unlikely that a substantial proportion of boys in a sample this young had already been conditioned to homosexuality by sex play with older brothers or anyone else.

In the third place, there exist survey data that argue directly against this explanation. Wellings *et al*. (1994, pp. 204–206) found that men who had attended all-male boarding schools were more likely than men who had not attended such schools to report some homosexual experience, but there was no difference between these groups in the amount of homosexual experience in later life. This suggests that homosexual sex-play in childhood is not an important determinant of sexual orientation in adulthood.

In conclusion, there is no obviously correct or even "best-bet" explanation of the fraternal birth-order phenomenon. It is likely that finding the correct explanation is going to be a difficult and lengthy endeavor. For example, decisive studies that might locate the fraternal birth-order mechanism in the prenatal or the postnatal environment (e.g., studies of homosexual and heterosexual adoptees who know their number of biologic as well as adoptive older brothers) are likely to prove difficult for practical reasons (e.g., scarcity of appropriate subjects). The present data, by further reinforcing the reliability of the birth-order phenomenon, show that no matter how difficult this theoretic problem may be, it must be solved in a comprehensive account of sexual orientation.

REFERENCES

Bailey, J. M., Pillard, R. C., Dawood, K., Miller, M. B., Farrer, L. A., Trivedi, S., and Murphy, R. L. (1999). A family history study of male sexual orientation using three independent samples. *Behav. Genet*. 29: 79–86.

Bailey, J. M., and Zucker, K. J. (1995). Childhood sex-typed behavior and sexual orientation: A conceptual analysis and quantitative review. *Dev. Psychol*. 31: 43–55.

Bell, A. P., Weinberg, M. S., and Hammersmith, S. K. (1981). *Sexual Preference: Its Development in Men and Women*, Indiana University Press, Bloomington.

Berglin, C.-G. (1982). Birth order as a quantitative expression of date of birth. *J. Epidemiol. Comm. Health* 36: 298–302.

Berglin, C.-G. (1985). Male antigenicity and parity. *Behav. Brain Sci*. 8: 442–443.

Birtchnell, J. (1971). Birth rank and mental illness. *Nature* 234: 485–487.

Blanchard, R. (1997). Birth order and sibling sex ratio in homosexual versus heterosexual males and females. *Ann. Rev. Sex Res*. 8: 27–67.

Blanchard, R., and Bogaert, A. F. (1996a). Homosexuality in men and number of older brothers. *Am. J. Psychiatry* 153: 27–31.

Blanchard, R., and Bogaert, A. F. (1996b). Biodemographic comparisons of homosexual and heterosexual men in the Kinsey interview data. *Arch. Sex. Behav*. 25: 551–579.

Blanchard, R., and Klassen, P. (1997). H-Y antigen and homosexuality in men. *J. Theor. Biol*. 185: 373–378.

Blanchard, R., and Sheridan, P. M. (1992). Sibship size, sibling sex ratio, birth order, and parental age in homosexual and nonhomosexual gender dysphorics. *J. Nerv. Ment. Dis*. 180: 40–47.

Blanchard, R., and Zucker, K. J. (1994). Reanalysis of Bell, Weinberg, and Hammersmith's data on birth order, sibling sex ratio, and parental age in homosexual men. *Am. J. Psychiatry* 151: 1375–1376.

Blanchard, R., Zucker, K. J., Bradley, S. J., and Hume, C. S. (1995). Birth order and sibling sex ratio in homosexual male adolescents and probably prehomosexual feminine boys. *Dev. Psychol*. 31: 22–30.

Blanchard, R., Zucker, K. J., Cohen-Kettenis, P. T., Gooren, L. J. G., and Bailey, J. M. (1996). Birth order and sibling sex ratio in two samples of Dutch gender-dysphoric homosexual males. *Arch. Sex. Behav*. 25: 495–514.

Blanchard, R., Zucker, K. J., Siegelman, M., Dickey, R., and Klassen, P. (1998). The relation of birth order to sexual orientation in men and women. *J. Biosoc. Sci*. 30: 511–519.

Bogaert, A. F. (1998). Birth order and sibling sex ratio in homosexual and heterosexual non-white men. *Arch. Sex. Behav*. 27: 467–473.

Byne, W., and Parsons, B. (1993). Human sexual orientation: The biologic theories reappraised. *Arch. Gen. Psychiatry* 50: 228–239.

Chahnazarian, A. (1988). Determinants of the sex ratio at birth: Review of recent literature. *Soc. Biol*. 35: 214–235.

Cobb, J. A. (1914). The alleged inferiority of the first-born. *Eug. Rev*. 5: 357–359.

Fedoroff, J. P., Jacques, T., Kazazic, S., and Peever, C. (1999). *An Internet survey of sadomasochism: birth order and gender effects*. Poster presented at the meeting of the International Academy of Sex Research, Stony Brook, NY.

Gebhard, P. H., Gagnon, J. H., Pomeroy, W. B., and Christenson, C. V. (1965). *Sex Offenders: An Analysis of Types*, Harper & Row, New York.

Green, R. (1987). *The "Sissy Boy Syndrome" and the Development of Homosexuality*, Yale University Press, New Haven, CT.

Green, R. (2000). Birth order and ratio of brothers to sisters in transsexuals. *Psychol. Med*. 30 (in press).

Hare, E. H., and Moran, P. A. P. (1979). Parental age and birth order in homosexual patients: A replication of Slater's study. *Br. J. Psychiatry* 134: 178–182.

Hare, E. H., and Price, J. S. (1969). Birth order and family size: Bias caused by changes in birth rate. *Br. J. Psychiatry* 115: 647–657.

Hare, E. H., and Price, J. S. (1974). Birth order and birth rate bias: Findings in a representative sample of the adult population of Great Britain. *J. Biosoc. Sci*. 6: 139–150.

Jagers, P. (1982). How probable is it to be first born? and other branching-process applications to kinship problems. *Mathemat. Biosci*. 59: 1–15.

James, W. H. (1987). The human sex ratio. Part 1: A review of the literature. *Hum. Biol*. 59: 721–752.

Jones, M. B., and Blanchard, R. (1998). Birth order and male homosexuality: Extension of Slater's Index. *Hum. Biol*. 70: 775–787.

Kinsey, A. C., Pomeroy, W. B., and Martin, C. E. (1948). *Sexual Behavior in the Human Male*, W.B. Saunders, Philadelphia.

Moore, D. H., and Gledhill, B. L. (1988). How large should my study be so that I can detect an altered sex ratio? *Fertil. Steril*. 50: 21–25.

Price, J. S., and Hare, E. H. (1969). Birth order studies: Some sources of bias. *Br. J. Psychiatry* 115: 633–646.

Purcell, D. W. (1995). *The effects of parent–child relationships on the relation between gender nonconforming behavior in childhood and psychological adjustment in adulthood*. Unpublished doctoral dissertation, Emory University, Atlanta, GA.

Slater, E. (1958). The sibs and children of homosexuals. In Smith, D. R., and Davidson, W. M. (eds.), *Symposium on Nuclear Sex*, Heinemann Medical Books, London, pp. 79–83.

Slater, E. (1962). Birth order and maternal age of homosexuals. *Lancet* i: 69–71.

Suarez, B. K., and Przybeck, T. R. (1980). Sibling sex ratio and male homosexuality. *Arch. Sex. Behav*. 9: 1–12.

Tsoi, W. F., Kok, L. P., and Long, F. Y. (1977). Male transsexualism in Singapore: A description of 56 cases. *Br. J. Psychiatry* 131: 405–409.

Wellings, K., Field, J., Johnson, A., and Wadsworth, J. (1994). *Sexual Behaviour in Britain: The National Survey of Sexual Attitudes and Lifestyles*, Penguin Books, London.

Zucker, K. J., and Blanchard, R. (1994). Re-analysis of Bieber *et al*.'s 1962 data on sibling sex ratio and birth order in male homosexuals. *J. Nerv. Ment. Dis*. 182: 528–530.

Zucker, K. J., Green, R., Coates, S., Zuger, B., Cohen-Kettenis, P. T., Zecca, G. M., Lertora, V., Money, J., Hahn-Burke, S., Bradley, S. J., and Blanchard, R. (1997). Sibling sex ratio of boys with gender identity disorder. *J. Child Psychol. Psychiatry* 38: 543–551.