

Sexual Deviance and Number of Older Brothers Among Sexual Offenders

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A number of studies have shown that the probability that a man is homosexual increases with the number of older brothers (but not sisters) born to his mother. This older brother effect suggests that a progressive maternal immunosensitization process is involved in producing homosexual preferences. A recent demonstration of the older brother effect in homosexual pedophilia raises the question of whether it is involved in other anomalous sexual preferences as well. In the present study, phallometric data were gathered from 29 child molesters, 38 rapists, and 11 individuals who had offended against both children and adults. In all groups, a phallometric index of sexual deviance (a relative preference for children or for coercive sex) was positively correlated with the offenders' number of older brothers (but not sisters). These results suggest that the maternal immunosensitization hypothesis may explain some variations in male sexual preferences.

KEY WORDS: birth order; pedophilia; homosexuality; sexual offending; sexual preferences.

INTRODUCTION

Sexual preferences measured in the laboratory have been shown to be related to men's sexual behaviors (reviewed by Harris & Rice, 1996). Men who choose female adults as sexual partners show greater sexual arousal to pictures and activities involving postpubertal, fertile women; their sexual preferences are related to those characteristics in women that signal fer-

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tivity, nubility, and health. Men who choose male adults as sexual partners are maximally responsive to pictures and sexual activities involving men (reviewed by Quinsey & Lalumière, 1995; Symons, 1979). Studies of child molesters clearly indicate that such behavior is often related to sexual preferences for underage persons (reviewed by Quinsey & Lalumière, 1996). Meta-analyses of studies comparing adjudicated rapists to nonrapists indicate that rape is strongly related to sexual preferences for coercive sex (Lalumière & Quinsey, 1993, 1994).

Preferences for same-sex partners or prepubertal children confer an obvious reproductive disadvantage to males who hold them. As discussed by Quinsey and Lalumière (1995), these preferences are likely the result of disruptions in the ontogenic organization of the sexual preference system. Recent theoretical and empirical work on the origins of homosexual preferences has suggested a potential cause of these developmental disruptions.

MacCulloch and Waddington (1981) and Ellis and Ames (1987) proposed that mothers sometimes produce an immune response to male sex hormones during pregnancy. This immune response would counteract, for a male fetus, the normal prenatal organizing effects of androgens, thereby disrupting sexual differentiation of the brain. These authors suggested that male homosexuals consequently have the sexual preferences characteristic of women. Gualtieri and Hicks (1985) proposed that maternal immunoreactivity affects male brain development more generally and that, because of the nature of the immune system, each successive male fetus increases the probability and the strength of an immune response and, therefore, the risk of disruption to brain development. If disrupted masculinization is due to maternal immunoreactivity, male homosexuals should be born later among brothers but not among sisters; this is because older brothers (but not sisters) engage the critical prenatal maternal immune response, and the probability and the strength of that response is a function of the number of prior male (but not female) fetuses.

In support of these ideas, male homosexuals have been found to be less masculinized with regard to qualities that show sex differences, such as some hypothalamic and commissural brain structures (Allen & Gorski, 1992; LeVay, 1991), auditory interhemispheric laterality (Reite, Sheeder, Richardson, & Teale, 1995), fingerprint patterns, (Hall & Kimura, 1994), spatial abilities (McCormick & Witelson, 1991), and weight and onset of puberty (Blanchard & Bogaert, 1996a). More important for the maternal immunosensitivity hypothesis, male homosexuals (but not female homosexuals) were born later among brothers but not among sisters (Blanchard & Bogaert, 1996a, b, 1997; Bogaert, *in press*). Blanchard and Klassen (1997) have proposed that the mechanism of maternal immunoreactivity involves minor histocompatibility antigens (rather than sex hormones). Although the specific mechanisms re-

main to be elucidated, the data suggest that one proximal cause of homosexuality involves maternal immunoreactivity.

Can the same considerations help explain the sexual preferences of child molesters and rapists? Based on the maternal immunosensitivity hypothesis, Quinsey and Lalumière (1995; Lalumière & Quinsey, 1996) argued that any sex-dimorphic, reproductively relevant features of male sexual preferences are liable to developmental perturbations during prenatal sexual differentiation. Thus, events similar to the intrauterine causes of homosexuality could disrupt age preference patterns, resulting in preferences for prepubertal children, or disrupt the preferences associated with the male courtship pattern (Freund, 1988, 1990), resulting in the hyperdominant preferences observed among paraphilic rapists.

Two studies have investigated the birth order of sexual offenders. Raboch and Raboch (1986) investigated the birth order of "sexual delinquents," including sexual aggressors against women, exhibitionists, child molesters, and homosexual delinquents. All subjects were less likely to be born first than men with sexual dysfunctions (unrelated to preferences). The child molester and homosexual delinquents were also more likely than the control group to be the last of three or more children. No detail was presented regarding the sex of the siblings. Bogaert, Bezeau, Kuban, and Blanchard (1997) found that homosexual and bisexual pedophiles, but not heterosexual pedophiles, had a later birth order among brothers but not among sisters. Bogaert *et al.* concluded that the older brother effect may be specific to homosexuality, regardless of the age of the target. However, it is possible that the heterosexual child molesters were less "pedophilic" than the homosexual child molesters: the degree of sexual attraction to children and its relation to the number of older brothers was not investigated.

In this study, we tested the prediction that sexual preferences for prepubertal individuals and for nonconsenting, violent sexual activities (hereafter called deviant preferences) are associated with a greater number of older brothers but not sisters. We present a strong test of this prediction using a one-group, correlational design with identified sexual offenders. We used the best available measure of sexual preference among sexual offenders—penile plethysmography.

METHOD

Subjects

The initial subject pool consisted of 139 sexual offenders assessed at the Penetanguishene Mental Health Centre Sexual Behaviour Laboratory between March 1974 and November 1994. No subject had a previous phal-

lometric assessment in any laboratory. Thirty-nine of the initial pool were dropped because the phallometric assessment results had been deemed invalid (21) or of doubtful validity (18) by the examiner.⁴ Of the remainder, 78 had information on file about birth order among brothers or among sisters and 75 had information on both. Twenty-nine were child molesters, 38 were rapists, and 11 subjects had offended against both a child and a female adult [see Chaplin, Rice, & Harris (1995) for a full operational definition of "child molester" and Rice, Chaplin, Harris, & Coutts (1994) for "rapist"]. All sexual offenders had been charged with or convicted of the offenses, admitted them, or had overwhelming evidence on file that they were the perpetrators.

The average age of the 78 subjects at the time of the assessment was 26.7 years ($SD = 10.8$ years). Thirty-three percent had been married or had lived in common-law relationships. Eighty-one percent were referred for phallometric assessment from a maximum-security psychiatric hospital and 19% from community agencies. Sixty-seven percent had no sexual charges prior to the index offense; the average number of prior sexual charges was 1.0. Sixty-five percent were diagnosed as personality disordered and 5% were diagnosed as schizophrenic. The average IQ was 102.8 ($SD = 15.2$). The average Psychopathy Checklist—Revised score (Hare, 1992) was 22.1 ($SD = 8.0$). Eleven percent had offended against boys, 81% against girls or women, and 8% against both sexes. Seven subjects (all child molesters) showed a homosexual orientation in the laboratory (see below).

Measures

The phallometric assessment has been described in detail elsewhere (Chaplin *et al.*, 1995; Harris, Rice, Quinsey, & Chaplin, 1996; Harris, Rice, Quinsey, Chaplin, & Earls, 1992; Rice *et al.*, 1994). The stimuli have changed slightly over the years and child molesters and rapists did not receive the same stimulus sets. Briefly, child molesters received visual stimuli to assess age and gender preferences and auditory stimuli to assess interest in coercive sexual activities with children. Rapists received auditory stimuli to assess interest in coercive sexual activities with adults. Some offenders received all three types of assessment. The scoring of sexual deviance is described below.

⁴Invalid results were due to low responses (it was only quite late in this period that we discovered that low responses are often valid), movement artifacts, or insufficient number of stimuli presented.

Birth order information was coded from very comprehensive hospital files. For this study, only siblings genetically related through the mother were included. The mother's age at the birth of each subject was also recorded.

Treatment of the Data

For each subject and for each stimulus set, penile responses were standardized to a mean of 10 and a standard deviation of 1. The responses were averaged for each stimulus category (e.g., consenting sex with female adults, pictures of prepubertal boys) within stimulus sets. Two average responses were coded for this study: The first was the largest average response to any deviant category (e.g., scenarios describing coercive sex with a female adult; pictures of prepubertal boys) from any stimulus set; the second was the largest average response to any nondeviant category (e.g., consenting sex with female adults, pictures of male adults) from any stimulus set. A Deviance Index was calculated by subtracting the nondeviant average response from the deviant average response. A positive Deviance Index reflected an absolute preference for deviant sexual targets or activities and its magnitude reflected the preference in standard deviation units.⁵ For present purposes, a homosexual preference was identified if the highest average response was to a category (deviant or nondeviant) describing a male victim/partner.⁶

Birth order was captured in two ways. The first was the number of older siblings of each sex; it is the simplest measure and is the most relevant to the theoretical considerations presented in the introduction (the number of younger siblings is irrelevant to the maternal immunosensitivity hypothesis). However, this measure is dependent on family size, and in this study, not normally distributed. The second dependent measure was the Berglin Index (Berglin, 1982) calculated separately for brothers and sisters: $[\text{number of older brothers (sisters)} + 0.5] / [\text{total number of brothers (sisters)} + 1.0]$. This index reflects relative birth order, allows the inclusion of singletons,⁷ is independent of family size and, in this study, is normally distributed. A value of .5 reflects an equal number of older and younger siblings and a value greater than .5 reflects a larger number of older siblings.

⁵In our previous publications a positive score reflected a nondeviant preference. The Deviance Index does not capture the direction of the gender preference because the focus of this study is on preferences for prepubertal individuals and for coercive sex, regardless of the sex of the target.

⁶No subject assessed in this study showed a preference for adult males and only six subjects (all child molesters) showed larger responses to male adults than to female adults. We also computed a deviance index that ignored responses to adult male stimuli. This modified index produced similar results.

⁷The Slater Index [number of older brothers (sisters) divided by total number of brothers (sisters)] resulted in a loss of too many subjects (singletons) and was not used in this study.

RESULTS

The average Deviance Index was +0.32 ($N = 78$; $SD = 0.98$). Subjects had an average of 1.2 older brothers ($N = 78$; $SD = 2.0$), 0.6 younger brother ($N = 77$; $SD = 0.9$), 0.9 older sister ($N = 76$; $SD = 1.5$), and 0.4 younger sister ($N = 76$; $SD = 0.8$). Their average Berglin Indices were .538 ($N = 77$; $SD = .25$) for brothers and .539 ($N = 76$; $SD = .22$) for sisters. Thus, as a group, subjects showed deviant sexual preferences (Lalumière & Quinsey, 1993). They had more brothers than sisters and more older siblings than younger.

The Pearson correlation between the Deviance Index and the number of older brothers was positive and statistically significant [$r(76) = .196$, $p < .05$, one-tailed (as are all subsequent tests)]. The same was true for the fraternal Berglin Index [$r(76) = .242$, $p < .05$]. The corresponding correlations for the number of older sisters [$r(74) = .090$, $p < .30$] and the sororal Berglin Index [$r(74) = .111$, $p < .20$] were also positive but not significant.⁸ The nonparametric Spearman rank-order correlations showed very similar patterns. The relation between the number of older brothers and the Deviance Index is shown in Fig. 1. Clearly, sexual deviance was linearly related to the number of subjects' older brothers.

Because having many older brothers is associated with having many older sisters in this and other studies (cf. Blanchard & Bogaert, 1996b), it is of interest to examine the correlation between the number of older brothers and sexual deviance while controlling for the number of older sisters. The relationship between the Deviance Index and the number of older brothers controlling for the number of older sisters was .181 ($df = 73$; $p = .06$); the correlation for the fraternal Berglin Index controlling for the sororal Berglin Index was .220 ($df = 72$; $p < .05$). The correlation between the Deviance Index and the number of older sisters controlling for the number of older brothers dropped to $-.046$ ($df = 73$; $p < .40$). The corresponding value for the sororal Berglin Index controlling for the fraternal Berglin Index dropped to .042 ($df = 72$; $p < .40$). The tendency for deviant sexual offenders to have more older sisters was, therefore, entirely the by-product of their tendency to have more older brothers.⁹

The correlation between the fraternal Berglin Index and the Deviance Index was positive in each subgroup: .237 among child molesters ($N = 29$),

⁸Although the theory does not call for one-tailed tests in the analysis of birth order among sisters, we still conducted these tests to provide a fair comparison with the analysis of birth order among brothers.

⁹We also calculated these partial correlations while controlling for maternal age at birth of subjects. All fraternal correlations remained positive but became nonsignificant because maternal age is, not surprisingly, positively associated with number of older brothers [$r(54) = .501$, $p < .001$].

Number of Older Brothers

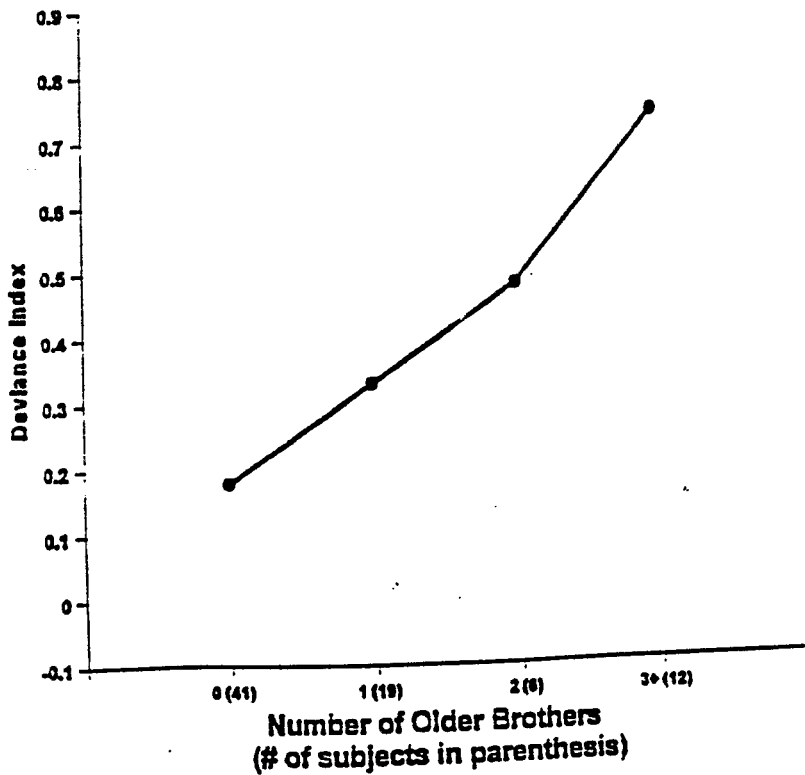


Fig. 1. Phallometric Deviance Index (computed as described in the text) as a function of number of older brothers.

.184 among rapists ($N = 37$), and .358 among offenders against both children and adults ($N = 11$). For homosexual offenders, it was .386 ($N = 7$), and for heterosexual offenders, .166 ($N = 70$).

The correlation between the fraternal Bergiin Index and the preferred gender among adult targets (female = 1, male = 2) was .148. The corresponding values for the preferred gender among child targets was .246. Excluding offenders with victims of both sexes, the correlation between the fraternal Bergiin Index and the sex of the victims was .271. A preference for male targets is thus associated with a larger relative number of older brothers regardless of the age of the targets. Unfortunately, it was not possible to examine the effects of number of older brothers on age and gender preference simultaneously.

The relationship between sexual deviance and number of older brothers could not be accounted for by a general tendency toward antisocial behaviors among later-born brothers. The correlation between the fraternal Bergiin index and psychopathy (Hare's PCL-R) was $-.035$ ($n = 62$); the correlation between sexual deviance and psychopathy was $-.108$ ($n = 63$).

DISCUSSION

Among a mixed group of male sexual offenders, the number of older brothers (but not older sisters) was positively correlated with the strength of deviant sexual preferences as measured by phallometric tests. The correlations were significant for both the absolute and the relative number of older brothers. The correlations were similar among heterosexual child molesters, homosexual child molesters, and rapists. Although the correlations obtained in this study were not large in an absolute sense, all subjects were sexual offenders (who, of course, comprise a minority of the general population). If we had included nonsexual offenders (that is, men whose deviance indices would have been on average nondeviant), the variation in scores on the Deviance Index would have been much greater. At the same time, one would expect nonsexual offenders to have a number of older brothers near the population mean (especially if homosexual men are excluded). The net effect of including nonsexual offenders would have been to raise the correlation between the Deviance Index and the number of older brothers.

This is the first demonstration that the older brother effect involved in male homosexuality also operates for other variations in male sexual preferences. Although the maternal immunosensitivity theory provides an elegant explanation for the older brother effect, these findings might be consistent with other explanations. For example, psychosocial influences associated with birth order might produce this effect (e.g., Sulloway, 1995). However, at present it is hard to imagine a psychosocial explanation involving older brothers (but not older sisters or younger siblings) that applies to male homosexuality, pedophilia, and preferential rape. The maternal immunosensitivity theory could be contrasted with postnatal theories with the following two predictions. First, the older brother effect should be found among individuals who were born late among genetically related brothers (through the mother) but who were raised as an eldest child (say, in a foster/adopted home). Similarly, the effect should not be found among individuals who were firstborn but who were raised as younger sons among brothers (step/adopted brothers). Second, even though a late birth order rarely leads to fetal problems, individuals who display anomalous partner/victim or sexual activity preferences should show subtle signs of disturbances in brain development such as fluctuating asymmetry, a maternal history of obstetrical complications, minor physical anomalies, and left-handedness.

Quinsey and Lalumière (1995) argued that the male sexual preference system is organized in a modular fashion, each module corresponding to a problem of reproduction in the ancestral environment. Thus, each module can malfunction independently. Yet because these male sexual preference

modules are organized *in utero*, it is possible that all may be influenced by enduring prenatal phenomena, raising the question of whether the older brother effect is additive, such that men who have multiple anomalous preferences have on average even more older brothers. The present data provide preliminary support for this view. The fraternal Berglin Index was .709 for the 7 homosexual child molesters and .526 for the 33 heterosexual child molesters. Studies with larger groups of offenders are needed to provide an answer to this interesting question.

Quinsey and Lalumière (1995) have attempted to link the identification of genetic origin for homosexuality (Hamer, Hu, Magnuson, Hu, & Patatucci, 1993; Hu *et al.*, 1995) with the maternal immunosensitivity hypothesis. They postulated that nonreproductively viable sexuality in offspring is the result of an adaptive tradeoff between an advantageous heritable immunocompetence in the mother and an increased likelihood that the mother's immune system will be sensitized *in utero* to some aspects of her sons. The original version of the theory was designed primarily to explain sexual preferences, such as pedophilia and homosexuality, that were likely to be associated with poor reproductive success. The present results suggesting that paraphilic rapists also demonstrate the older brother effect lead to the speculation that the reproductive costs of immunocompetence may not be as high as originally thought. It is unclear, however, what the association between reproductive success and a preference for coercive sexual behavior would have been in the environment of evolutionary adaptation.

These findings, and the maternal immunosensitivity interpretation, do not speak to whether attempts to modify sexual offenders' deviant preferences can be successful. In other words, knowing that a phenomenon has a prenatal basis does not necessarily limit the classes of interventions that could alter it (the case of the prevention of phenylketonuria provides a telling demonstration of this fact). We hope that this investigation will generate a renewed interest in the study of the origins of sexual deviance.

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**Harris, G.T. & Rice, M.E. (1998). In reply to
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*Psychiatric Services, 49, 388.***

LETTERS

6. Rice ME, Harris CT, Varney CW, et al: Violence in Institutions: Understanding, Prevention, and Control. Seattle, Hogrefe & Huber, 1989

In Reply: Dr. Menuck fires a salvo at the messengers; we address his four darts in order:

First, he takes issue with our statement that there is in fact "no evidence . . . that clinicians' unaided judgments are better than those of laypersons in assessing violence risk." Better-than-chance accuracy of clinical judgment does not contradict that. Predictions by psychiatrists and laypersons are indistinguishable in basis, substance, and reliability (1). Forensic clinicians' predictions are no different from those of clinicians without forensic training and experience (2). Because clinicians and laypersons alike base their predictions on history of violence, it is unsurprising that accuracies sometimes exceed chance. Dr. Menuck's assertion that clinicians predict violence with the same accuracy as actuarial tools is false. The references he cited do not support his contention, and the one by Gardner and associates demonstrated yet again the practically universal finding from hundreds of studies that actuarial methods are superior.

Second, our review explicitly concerned violence among psychiatric patients, forensic patients, and released prisoners. Among such populations, psychosis is unrelated or inversely related to subsequent violence (3). Psychoses (or more accurately, some symptoms) might be related to violence in the general population, but that was clearly not our topic. The size of the relationship in the general population, if it exists, is small compared with, for example, the relationships for substance abuse and psychopathy. Menuck's comments about the nonapplicability to individuals of results derived from large samples and the unquantifiable nature of individual psychopathology illustrate but two of many well-documented errors to which human judgment is prone (4-6).

Third, our point was that a few symptoms *might* be related to vio-

lence or treatment for them *might* help control it. Zisook and associates found two of 46 patients with violent command hallucinations (albeit toward themselves) committed lethal violence, leading us to suggest that command hallucinations might increase risk. Nowhere did we state that violent patients can be effectively managed with drugs. Allan and associates found that nadolol was unrelated to improvement in aggression, though related to other improvements, leading them to conclude, "Aggressiveness and psychosis can be orthogonal."

Fourth, consider, by analogy, the difference between a treatment target and a beneficial collateral effect for a fractured tibia. Proper treatment (splinting, immobilization with a cast, and so on) inevitably brings pain relief—a collateral benefit. However, treatment targeted only at pain relief obviously brings harm rather than benefit. Research indicates that in treating violent individuals, harm results from therapy aimed at raising self-esteem even though increased self-esteem might be a collateral benefit of appropriate treatment.

We appreciate that these scientific facts might be unwelcome news to practitioners who rely on unaided clinical assessment of dangerousness, drugs to treat psychotic symptoms (and thereby violence), and insight-oriented, emotionally based psychotherapy for violent offenders. Nevertheless, our positive message was that improvements in the prediction and management of violent recidivism among high-risk offenders can be attained when clinicians practice along the lines we suggested.

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