

The Etiology of Anomalous Sexual Preferences in Men

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ABSTRACT: People discover rather than choose their sexual interests. The process of discovery typically begins before the onset of puberty and is associated with an increase in the secretion of sex hormones from the adrenal glands. However, the determinants of the direction of sexual interest, in the sense of preferences for the same or opposite sex, are earlier. These preferences, although not manifest until much later in development, appear to be caused by the neural organizational effects of intrauterine hormonal events. Variations in these hormonal events likely have several causes and two of these appear to have been identified for males. One cause is genetic and the other involves the sensitization of the maternal immune system to some aspect of the male fetus. It is presently unclear how these two causes relate to each other. The most important question for future research is whether preferences for particular-aged partners and parts of the male courtship sequence share causes similar to those of erotic gender orientation.

KEYWORDS: paraphilia; sex offenders; hormones; neural development; pedophilia; homosexuality

THE ETIOLOGY OF ANOMALOUS SEXUAL PREFERENCES IN MEN

Variations in sexual preferences have both proximate and ultimate causes. Proximate causes include genetically initiated events, brain structures, and learning (experience-induced neural changes). Ultimate causes refer to the features of ancestral environments that were the agents of selection producing the species-typical reproductive behavior we observe today. Many of the findings relevant to ultimate causation concern cross-culturally invariant similarities of and differences between the sexual psychologies of men and women. Current human sexual interests and desires appear to be exquisitely designed to foster reproductive success in ancestral environments.

Sexual preferences refer to how an individual would like to reach orgasm (Langevin, 1983). Thus, an individual can have sexual preferences for particular sexual activities or types of partners that are not behaviorally expressed. Sexual preferences are termed anomalous if they are associated with activities or partner types that are reproductively irrelevant or harmful to the individual's fitness interests. Reproductively irrelevant behaviors include masturbation, fetishism, voyeurism, and so

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forth; reproductively irrelevant partners are those who are of a different species, the same sex, of pre- or postreproductive age, or dead. It is the *preference* for these activities or types of partners that is anomalous, not merely finding them erotic or involving them in sexual behavior. Masturbation may keep a man fit for intercourse or eliminate tired sperm, fetishism may be involved in foreplay; in time, a prepubertal child is likely to become fertile. The idea, however, is that anomalous sexual preferences would be expected to have decreased personal Darwinian fitness in ancestral environments. This paper discusses anomalous sexual preferences involved in male homosexuality and pedophilia. Before turning to these topics, however, the evidence for a male sexual preference system that focuses male attention on reproductively relevant stimuli will be presented.

THE MALE SEXUAL PREFERENCE SYSTEM

Heterosexual men prefer young adult females as sexual partners. The evidence comes from studies of the sexual attractiveness of stimulus persons who vary in age and sex measured by ratings, covertly measured viewing time, and changes in penile tumescence (Freund, Langevin, Cibiri and Zajac, 1973; Harris et al., 1992, 1996; Jankowiak, Hill & Donovan, 1992; Quinsey & Chaplin, 1988a; Quinsey et al., 1975, 1993, 1996; Silverthorne & Quinsey, 2000). Men prefer features that are associated with fertility and health, including symmetrical faces with particular neotenous features (Johnston, 1999) and average weight figures with hip to waist ratios typical of young adult women (Singh, 1993). There is very strong agreement among observers' ratings of the beauty of female faces (Johnston, 1999) and as far as known, these preferences occur across cultures (Bradshaw, Bubier & Sullivan, 1994; Cunningham, Roberts, Barbee, Druen & Wu, 1995; Johnston, 1999; Korthase & Trenholme, 1982; Singh & Luis, 1995). Preferred partner age remains constant over age among adult men (Bradshaw, Bubier & Sullivan, 1994; Korthase & Trenholme, 1982; Silverthorne & Quinsey, 2000).

Heterosexual men are more interested in sexually novel partners than are women, giving rise to what can be termed a "male courtship pattern" characterized by greater male interest in pictures of nudes and erotic movies, desiring a greater number of sexual partners, greater male striving for actual sexual encounters, less discrimination among potential sexual partners in short-term mating contexts, and so forth (for reviews see Buss, 1989; Buss & Schmitt, 1993; and Hamida, Mineka & Bailey, 1998). The ultimate explanation for these features of the male sexual preference system turns on the observation that the principal limiting factor on male reproductive success in ancestral environments was the number of a man's sexual partners, whereas the principal limiting factor on female reproductive success was the resources a woman could obtain to raise the offspring she had, not the number of her sexual partners.

Sexually dimorphic anatomical features are associated with the different sexual psychologies of men and women. In addition to sex-typical primary and secondary sexual characteristics and body sizes, there are reproductively relevant differences in brain structures. The preoptic hypothalamus is both sexually dimorphic and involved in reproduction across the vertebrates, in part through its production of gonadotropin releasing hormone (Grober, 1997). In humans, sex differences have been found in

the sexually dimorphic nucleus of the preoptic hypothalamus, the second and third interstitial nucleus of the anterior hypothalamus (INAH-2 and 3), the suprachiasmatic nucleus, and the bed nucleus of the stria terminalis (Allen et al., 1989; LeVay, 1994; Swaab, Zhou, Fodor & Hofman, 1997). With respect to the latter structure, Zhou et al. (1995) found that the central nucleus of the bed nucleus of the stria terminalis was larger in heterosexual and homosexual men than in women and male-to-female transsexuals, suggesting that this area is involved in gender identity but not sexual orientation.

Other sexually dimorphic neuroanatomical traits are not obviously related to reproductive behavior. These include a larger anterior commissure in women than men (Allen & Gorski, 1991) and a more bulbous-shaped posterior corpus callosum (the splenium) in men than women (Allen, Richey, Chai & Gorski, 1991). A variety of other sex differences appear to result from differences in early neurodevelopment. Men show greater rightward dermatoglyphic (fingerprint ridge count) asymmetry than women (Hall & Kimura, 1994), are more likely to be left-handed (Coren, 1993), and to suffer differentially from a large number of non-sex chromosome-linked neurodevelopmental problems known as “selective male afflictions” (Gualtieri & Hicks, 1985). The sexes are also differentiated by their occupational preferences (Lippa, 2002) and their performance in many cognitive and motor tasks (for reviews, see Collier & Hines, 1995; Halpern & Crothers, 1997; Kimura, 2000).

MALE HOMOSEXUALITY

The sexual dimorphism of anatomical structures results from the influence of hormones during the development of a wide variety of species. Often these hormones organize neural tissues that guide subsequent development and behavior. For example, the quality of male copulatory behaviors in a number of vertebrate species is affected by prenatal hormonal influence. More importantly in the present context, sex-typical preferences for opposite sex partners can sometimes be reversed by interventions in the organizational phase of neurodevelopment, for example, in rats (Brand et al., 1991) and zebra finches (Adkins et al., 1997). The organizational effects of prenatal hormones are also important in the development of erotic gender preference in humans (Ellis & Ames, 1987; Meyer-Bahlburg et al., 1995) and the resulting erotic preferences in males appear to be relatively fixed, probably prepubertally (Beckstead, in press; Bell, Weinberg & Hammersmith, 1981; Green, 1988; McClintock & Herdt, 1996). Male sexual gender preferences are highly bimodal whether measured by questionnaire (Ellis, Burke & Ames, 1987; Kinsey et al., 1953) or phallometric assessment (Freund & Costell, 1970; Freund et al., 1973). Bisexual behaviors among men are very common, but bisexual preferences are rare.

Although homosexual men, like heterosexual women, prefer masculine-appearing male sexual partners (Bailey et al., 1997), they nevertheless display a typically male courtship pattern. Homosexual men are as interested in partner variety as heterosexual men, though they succeed in having more partners than heterosexual men, presumably because heterosexual men have to compromise with the preferred courtship pattern of women (Bailey et al., 1994; Symons, 1979). The male-typical mating effort of male homosexuals is strong evidence for the modularity of the male sexual preference system because it shows that courtship pattern and preferred partner sex

are dissociable. The typically male interest in mating effort of male homosexuals invalidates Wilson's (1975) evolutionary "helper at the nest" explanation of male homosexuality which argues that homosexuality was selected for by the inclusive fitness advantages accrued by heterosexually disadvantaged men providing care for their siblings' children; contemporary American homosexual men do not invest more than heterosexual men in their relatives, including their siblings' children (Bobrow & Bailey, 2001). In a related vein, LeVay (1994) has pointed out that the inclusive fitness explanation does not account for homosexual preferences, only the lack of heterosexual mating effort.

Male homosexuality is partly heritable (Bailey, Dunne & Martin, 2000; Bailey et al., 1999; Bailey & Pillard, 1991; Whitam, Diamond & Martin, 1993) and there is evidence that the genetic transmission is maternal (Hamer & Copeland, 1994; Turner, 1995). Certainly the great majority of adult sons of male homosexuals are themselves heterosexual (Bailey et al., 1995). Hamer et al. (1993) found a link between a locus on the X chromosome (Xq28) and homosexuality in men but not among women (Hu et al., 1995), although there has been a failure to replicate this finding (Rice et al., 1999). Homosexuals and male-to-female transsexuals have more maternally related aunts than uncles (Green & Keverne, 2000; Turner, 1995). This observation again suggests the involvement of the X chromosome as well as genomic imprinting (imprinted genes are those that are expressed differently depending upon whether they are maternally or paternally derived). The inheritance of male homosexuality is puzzling given the relatively poor reproductive success of homosexual men (e.g., Hamer & Copeland, 1994).

Adult male homosexual orientation is strongly linked to cross-sex-typed behavior in childhood in both prospective and retrospective studies (Bailey & Zucker, 1995; Bell, Weinberg & Hammersmith, 1981). The observation that prehomosexual boys prefer to play with girls challenges theories of sexual orientation, such as that of Storms (1981), that depend upon differential interaction of boys with other boys. However, childhood gender nonconformity is not a cause of homosexuality in itself; rather, it reflects earlier events. Evidence for this proposition comes from studies of 5-alpha reductase-2 deficiency androgen-insensitivity syndrome. Boys with this syndrome have female external genitalia until puberty, when they develop in a typically masculine fashion. Although these boys are raised as girls prepubertally, the majority appear to have heterosexual preferences as adults (Imperato-McGinley et al., 1979), providing strong evidence that cross-sex-typed childhood behavior is not a sufficient cause of adult homosexual preference.

Male homosexuals resemble women more than heterosexual men on many sexually dimorphic characteristics in addition to childhood play preferences. Females reach puberty earlier than males and homosexual men reach puberty earlier than heterosexual men (Bogaert, Friesen & Klentrou, 2002). Homosexual men have been found to exhibit less rightward dermatoglyphic asymmetry than heterosexual men (Hall & Kimura, 1994), although there have been failures to replicate this result (Mustanski, Bailey & Kaspar, 2002). The size of the anterior commissure is smaller (Allen & Gorski, 1992) and that of INAH-III larger (LeVay, 1991) in heterosexual than in homosexual men. In contrast to these characteristics in which homosexual men tend to resemble women, a greater proportion of homosexual than heterosexual men are non-right handers (Lalumière, Blanchard & Zucker, 2000). Homosexual men also score like women or intermediate between heterosexual men and women

on cognitive tasks that differentiate between the sexes: visuospatial abilities (Sanders & Ross-Field, 1986a; Wegesin, 1998), left visual field bias (Sanders & Ross Field, 1986b), throwing to a target (Hall & Kimura, 1995), a lexical decision/semantic monitoring task (Wegesin, 1998), but not fine motor skills (Hall & Kimura, 1995). Male homosexuals prefer female-typical occupations as adults (Lippa, 2002).

Male homosexuals have more older brothers than male heterosexuals (Blanchard, 1997, 2001; Blanchard et al., 1995; Blanchard & Zucker, 1994). Each older brother increases the odds of homosexuality by 33 percent (Blanchard & Bogaert, 1996), which means about 14% of homosexuals owe their sexual orientation to the fraternal birth-order effect (Cantor, Blanchard, Paterson & Bogaert, 2002). Blanchard and Klassen's (1997) maternal immune hypothesis asserts that Y (male) chromosome-linked minor histocompatibility antigens (H-Y antigens) on the surface of male fetal cells progressively sensitize the maternal immune system with each male fetus. The resulting maternally produced anti-H-Y antibodies disrupt the masculinization of the fetal brain.

Several observations lend credence to the maternal immune hypothesis of male homosexuality. Placental cells do not express H-Y antigens, suggesting that the placenta plays a role in hiding the foreign paternal genome from the maternal immune system (Bodmer & McKie, 1994). Intra-uterine mortality is higher for males than females (Gualtieri & Hicks, 1985). Neurodevelopmental anomalies are more common in males than females and occur more frequently in males born later in a sibline (Gualtieri & Hicks, 1985). Left-handedness, thought to reflect perturbations in neurodevelopment, is more common in males than females and in homosexual males than heterosexual males (Lalumière, Blanchard & Zucker, 2000) and fluctuating asymmetry, another reflection of neurodevelopmental difficulty, correlates positively with fraternal birth order (Lalumière, Harris & Rice, 1999). Males with older brothers are smaller at birth than those with older sisters (Côté, Blanchard & Lalumière, *in press*; Ellis & Blanchard, 2001). Finger ridges develop during the time that the brain is masculinized *in utero*, explaining the feminized pattern of dermatoglyphic asymmetry displayed by male homosexuals. Homosexual males' small INAH-III more directly reflects interference with the masculinization of the brain. It is, however, apparent that the hypothalamus of male homosexuals is not simply a feminized structure, but rather a different one: For example, there is no difference in the sexually dimorphic nucleus of the preoptic hypothalamus between heterosexual and homosexual men, but a large difference in the nonsexually dimorphic number of vasopressin neurons in the suprachiasmatic nucleus (Swaab et al., 1997). Hypothalamic structures appear to be formed differentially by paternally imprinted genes (Goos & Silverman, 2001). Thus the structures involved in sexual motivation are expected to reflect the father's rather than the mother's genetic interest and be designed to extract resources from the mother and her kin. If male homosexual preference results from selective pressures, these are likely to be complicated and partly reflect genetic conflict.

The fraternal birth order effect does not explain all male homosexuality: for example, some homosexuals are first-born. There may be several etiological paths that converge on a disruption of the masculinization of the brain: one genetic path, one via sensitization of the maternal immune system, and perhaps others having to do with stress (Kinsley, Lambert & Jones, 1997), maternal ingestion of toxic substances, and so forth. The most interesting question, however, involves the relation-

ship between the inheritance of male homosexuality and the maternal immune hypothesis. If these etiological paths are not independent, the genetic link could be provided by the inheritance of variations in the sensitivity of the maternal immune system (Quinsey & Lalumière, 1995). The attractiveness of this conjecture is that it provides a countervailing maternal benefit (decreased likelihood of dying from an infectious disease) to the maternal fitness cost incurred by the poor reproductive performance of homosexual men. This countervailing benefit could explain why, if partly heritable, homosexuality is not bred out of the population.

PEDOPHILIA

By definition, pedophilic men prefer prepubertal children as the object of their sexual interest. This definition excludes men who opportunistically engage in sexual activity with children, but prefer adult partners (Freund, Watson & Dickey, 1991). Phallometric measures of sexual interest discriminate men who are known to have had sex with children from those who have not and, among those who have sexually contacted children, the sex of the children involved (e.g., Freund & Blanchard, 1989; Freund & Watson, 1991; Harris et al., 1992; Quinsey et al., 1975).

A very limited amount of evidence suggests that pedophilic age preferences develop prepubertally. Freund and Kuban (1993) found that a greater proportion of pedophiles than men who preferred adults reported childhood curiosity about seeing children but not adults in the nude. These retrospective self-reports suggested that erotic gender preferences were established prior to age preferences. A companion study showed that among heterosexual men who were erotically oriented toward adults (gynephiles), interest in children of the preferred sex disappeared around the time of puberty, suggesting an active devaluation of the nonpreferred age category.

The origins of variations in sexual age preferences are not known, but a number of potential causes can be ruled out. Childhood sexual experience has been an intuitively appealing and popular etiological candidate but can be rejected on several grounds. Within- and between-gender sex play among children is extremely common, whereas pedophilic preferences are uncommon in men and perhaps nonexistent among women. The fact that almost all sex offenses against children are committed by men and most of these against female children (Carlstedt, Forsman & Soderstrom, 2001) rules out any simple etiological role of early sexual experience in the development of pedophilia. In the most ambitious and best-controlled study of adjudicated offenders, Gebhard et al. (1965) found that a minority of sex offenders reported sexual contact with adults and the proportion so reporting was no higher among men who sexually offended against children than men who had committed nonsexual offenses. In societies where sex between boys and men is very common, the boys take wives and have children as adults (Herdt, 1984), suggesting that they develop male-typical sex and age erotic preferences. The evidence supporting the early sexual experiences hypothesis is very weak, mostly consisting of the retrospective reports of identified offenders contrasted with inadequate comparison groups (Garland & Dougher, 1990).

Conditioning interpretations of the presumed effects of early sexual experience have frequently been advanced. Experimental attempts to condition sexual arousal to neutral or nonpreferred stimuli in adult subjects (e.g., Lalumière & Quinsey,

1998), however, suffer from the same ambiguities of interpretation as the treatment literature that uses conditioning techniques to eliminate arousal to preferred stimuli because it is entirely unclear whether the changes observed actually reflect changes in enduring underlying preferences, and there is good reason to believe from studies of instructional control that they do not (Quinsey & Chaplin, 1988b).

The failure to find experiential determinants of pedophilic preferences, their early appearance, and their apparent stability encourage the development of a neurohormonal explanation. The central idea is that the male sexual preference system comprises a number of neurally based modules that correspond to ancestrally recurring reproductive problems. These include determining the appropriate sex and age of partner, as well as particular courtship patterns. We have seen how male homosexuality can be interpreted as resulting from a perturbation in the masculinization of the brain. Pedophilia could develop from a variant of the same process.

If a variant of the neurohormonal theory of sexual orientation explains pedophilic age preferences, we would expect links between age and gender preferences. Among men and women who prefer adult partners, there is some evidence that age and gender preferences develop independently of each other. Silverthorne and Quinsey (2000) found in a rating study of sexual attractiveness that homosexual and heterosexual men preferred younger partners of their preferred sex than did homosexual and heterosexual women. In contrast to all other groups, the homosexual women rated older persons of their preferred sex as more attractive than younger. However, this study included no children as stimuli. In a study that did include child stimuli, Freund, Watson, and Rienzo (1989) found that the phallometrically measured age preferences of male heterosexuals was very similar to those of male homosexuals for their preferred sexes. However, comparisons of the age preferences of men who prefer adult partners with those who prefer children indicate that age and gender preferences are linked. Whereas 2 to 4% of men who prefer adults have homosexual preferences, 25 to 40% of pedophiles do (Blanchard et al., 2000). There is also more bisexual interest among pedophiles than among men who prefer adults in phallometric assessments (Freund & Langevin, 1976; Freund & Watson, 1992; Quinsey & Chaplin, 1988a).

There is a strong fraternal birth-order effect for sexual orientation among homosexual pedophiles just as there is among men who erotically prefer adult men, or androphiles (Blanchard et al., 2000). But the correlates of homosexual pedophilia are not all the same as those of androphilia. Homosexual pedophiles do not reach puberty earlier like androphiles (Blanchard & Dickey, 1998) and retrospectively reported cross-gender childhood behavior has not been linked with homosexual preference among pedophiles as it has with androphiles (Freund & Blanchard, 1987).

The correlates of homosexual pedophilia are also not identical to those of heterosexual pedophilia. On average, homosexual pedophiles prefer older children than do heterosexual pedophiles (for a review see Quinsey, 1986). Homosexual pedophiles report having engaged in less boyhood aggression than heterosexual pedophiles, who in turn report less than heterosexual controls (Freund & Blanchard, 1987). More importantly, a fraternal birth-order effect has not been demonstrated for heterosexual pedophiles (Blanchard et al., 2000), even though such an effect has been shown in mixed groups of sexual offenders, including officially identified rapists (Coté, Earls & Lalumière, 2002; Lalumière et al., 1998). Nevertheless, in support of the application of the neurohormonal theory to heterosexual pedophiles, Cantor et al. (2002)

found a greater prevalence of left-handedness among both heterosexual and homosexual pedophiles than among men who had committed sex offenses against adults. This same study found a relationship between lower intelligence and younger preferred victim age in both heterosexual and homosexual pedophiles.

Progress in understanding the etiology of pedophilia will be facilitated by investigations of the same genetic and neuroanatomical factors that are involved in other anomalies of the male sexual preference system.

SUMMARY AND CONCLUSIONS

The direction of erotic gender preference in men appears to be determined by neurohormonal intrauterine events, although the details of this process remain to be established. Both genetic and developmental (the fraternal birth order effect) antecedents to these neurohormonal changes have been found, but the relationship between these classes of antecedents remains obscure. The neurohormonal events involved in producing male homosexual erotic preferences also result in behavioral, cognitive, and neuroanatomical features that are often, but not always, more typical of women than men. The clearest example of the fact that the characteristics of homosexual men are not all feminized and that the male sexual preference system is modular is that homosexual men show the male-typical interest in partner novelty.

The origins of variations in erotic age preferences are essentially unknown, although there is some circumstantial evidence favoring a neurohormonal developmental hypothesis. The neurohormonal theory applies to the sexual orientation of pedophiles because homosexual pedophiles are, like androphiles, born later among brothers. The theory has not been shown to apply to erotic age orientation *per se* because there is no fraternal birth-order effect for heterosexual pedophilia. Nevertheless, the causes of variations in gender and age orientation are likely to be related, as indicated by the much higher proportion of men with homosexual interests among pedophiles than men who prefer adult partners. It is unknown whether pedophilia is associated with the X chromosome because there have yet been no genetic studies of pedophiles.

Given the evidence for the modularization of the male sexual preference system and the influence of prenatal hormones on its development, neurohormonal developmental theories may be capable of explaining other anomalies and variations in sexual preferences. There are some encouraging data for rapists in this respect. A small proportion of rapists are extremely persistent (Walker, personal communication, 1998), a larger proportion exhibit a preference for descriptions of brutal rapes over consensual sex in phallometric assessment (e.g., Lalumière & Quinsey, 1994; Quinsey, Chaplin & Upfold, 1984), and a fraternal birth-order effect among rapists has been found twice (Coté, Earls & Lalumière, 2002; Lalumière et al., 1998).

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