Birth Order and Number of Older Male Siblings: Evidence of a Downstream Intrauterine Testosterone Effect

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ABSTRACT
We present evidence to support a downstream effect of testosterone for individuals having one or more older brothers. Data from two independent samples in two separate studies show that birth order and number of older male siblings play a significant role in the development of specific behavioral and psychological characteristics. Number of older brothers was positively correlated with handgrip strength (HGS) in females (p < .05), and negatively correlated with hip diameter in males (p < .05). High HGS and narrow hip morphology are masculine-specific characteristics that are both under the influence of testosterone. In addition, we provide preliminary evidence that as the number of older brothers increases the onset of sexual intercourse in females occurs at earlier ages. This effect is even more pronounced when the female’s immediate older sibling is a male. These data are consistent with the possibility of a downstream intrauterine testosterone effect.

OBJECTIVES
Here we investigated the effects of older siblings and birth order on aspects of body morphology and behavioral characteristics. We hypothesized a downstream effect of testosterone in individuals with one or more older brothers. Research has shown that prenatal exposure to testosterone can affect female’s brain development and lateralization (Knickmeyer et al., 2006; Cohen-Bendahan et al., 2004; Dimmick et al., 1999). Existing theories also suggest that sex-typical behavior also seems to be influenced by prenatal androgen levels. Research has shown that females who have been exposed to increased levels of testosterone in-utero show more specific preferences/personality traits (Cohen-Bendahan et al., 2004; Knickmeyer et al., 2006; Pasternak et al., 2005; Nordenskiöld et al., 2002; Grimbah et al., 1998). Based on previous research on animal models (Steckler et al., 2005; Zelickson et al., 2004; Hotchkiss et al., 2002; Wolf et al., 2001; Niehs et al., 1997), we predicted that more masculine specific characteristics would be present in individuals with older brothers. Additionally, we predicted that a distinct model product that in utero the fetus can be subjected to androgens in the mother’s womb that can influence the development of the brain and personality traits in the fetus. We hypothesized that this effect would be even more pronounced in those individuals with immediate older brothers; that is when there is no sibling who is a boy. The behavioral traits that were studied included shoulder-to-hip ratio (SHR) in males, and waist-to-hip ratio (WHR) in females. We also examined differences in previous research (Gallup et al., under review; Manning et al., 2000), handgrip strength (HGS) and second and fourth digit ratios (2D:4D) was also recorded in both males and females. Prematurity and the onset of sexual activity were also collected.

METHODS
Data from two independent samples in two separate studies were analyzed. The first sample included 75 males and 53 females. This study included survey data along with morphological measurements. SHR, WHR, HGS, and 2D:4D ratios were all recorded. Questions regarding birth order and siblings were also collected including age and sex of siblings. This sample is limited because specifics regarding abortion, miscarriage, and birth order and maternally relatedness were not present. Sexual history was also recorded. The second sample included 60 males and 123 females. These data were collected using a mass survey method and did not include any morphological data. More sophisticated methods were taken to record sibling data; however questions concerning adoption and miscarriage were not asked. Questions regarding each sibling’s relationship were also asked in order to explain each sibling’s relationship in detail (i.e., full sib, maternal ½ sib, paternal ½ sib, etc.). Sexual history was also recorded.

RESULTS
In the first study, the only significant correlate between males and number of older brothers was hip morphology (r = .226, p < .05, N = 76). These data are interesting because in relation to a broad shoulder diameter, a narrow hip structure is a masculine-specific biological feature. In females, hip morphology is positively correlated with the number of older brothers. Handgrip strength (HGS), another masculine-specific characteristic, is also positively correlated with number of older brothers (r = .273, p < .05, N = 53). In the second study, the presence of older male siblings seemed to inhibit the onset of sexual activity in males. Males with an immediate older male sibling engaged in oral sex at later ages (r = .290, p < .05, N = 54). In females, we observed the opposite effect. Females with older male siblings tended to engage in heterosexual sexual activity at earlier ages. This effect was more pronounced by the presence of an immediate older brother after you control for maternal similarity.

DISCUSSION
The presence of older male siblings correlates with a variety of behavioral and biological characteristics. In our two studies, this effect is consistently seen in females. Number of older brothers predicted the onset of sexual activity as well as sex of the individual. Although not significant, the presence of older, maternal, male siblings correlated with an earlier onset of sexual activity in females. This trend is consistent with the notion that a change in the uterine environment due to the presence of earlier male pregnancies may result in more masculine-specific characteristics in females. In males, number of older brothers significantly correlated with a narrow hip structure. Interestingly, the presence of older male siblings seemed to delay sexual activity in males. The presence of an immediate older, maternal brother seemed to prolong the onset of oral sex and sexual intercourse in males. These data may support recent evidence showing that the number of older brothers may affect sexual orientation (Petrie et al., 2006; Blanchard & Bogaert, 1999).

Based on previous research (Manning et al., 2000), we hypothesized that number of older male siblings would significantly alter the digit ratios in subsequent births. We predicted females to be most noticeably affected. However, second and fourth digit ratios (2D:4D) did not predict birth order or the number of older brothers in males or females. Earlier onset of sexual activity (as seen in females) higher HGS, and narrow hip morphology is related to the shoulder to hip breadth. Differences in males are all representative of masculine specific characteristics. This further supports the notion of an intrauterine testosterone effect in humans. That is, previous data supports that morphological traits and sexual behavior due to increased levels of prenatal testosterone. The presence of androgens in the mother’s womb due to prior male pregnancies may influence the development and behavior of the subsequent fetus. This is also consistent with several other studies that have shown the prenatal environment (i.e., intrauterine growth retardation, reducing ovarian reserve and increasing ovarian follicular recruitment. Further studies will track blood testosterone levels and correlate the effect with the presence of previous males or females. The incidence of abortion and miscarriage may also be tracked to better support the hypothesis.

REFERENCES