

# Birth Order and Sibling Sex Ratio in a Population with High Fertility: Are Turkish Male to Female Transsexuals Different?

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**Abstract** Western studies have consistently found that androphilic (sexually attracted to men) male-to-female transsexuals have a later birth order and a relative excess of brothers compared with appropriate control participants. However, non-Western studies on birth order and sibling sex ratio in androphilic males (transsexual or non-transsexual) are rare. The objective of the study was to test the hypothesis that androphilic male-to-female transsexuals have a late birth order and a relative excess of brothers in a non-Western culture with a higher fertility rate. The participants were 60 androphilic male-to-female transsexuals and 61 male heterosexual controls. The transsexual participants had significantly more older brothers than the control participants, but the groups did not differ in their numbers of older sisters, younger brothers, or younger sisters. The foregoing pattern is usually referred to as the “fraternal birth order effect.” Slater’s and Berglin’s Indexes both showed that the mean birth

order of the control participants was very close to that expected from a random sample drawn from a demographically stable population whereas the mean birth order of the transsexual participants was later. A measure of sibship composition, brothers/all siblings, showed that the transsexual group had a higher proportion of male siblings compared with the control group. In conclusion, the present study found that Turkish androphilic male-to-female transsexuals show the same high fraternal birth order that has been found in comparable androphilic samples in Western Europe, North America, and the South Pacific, which suggests a common underlying biological causal mechanism.

**Keywords** Birth order · Sibling sex ratio · Gender identity disorder · Transsexualism · Androphilia · Cross-cultural

## Introduction

According to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5), gender dysphoria is emotional distress over “a marked incongruence between one’s experienced/expressed gender and assigned gender” (American Psychiatric Association, 2013). The phenomena of transsexualism and gender dysphoria are present in many cultures. The etiology is unknown, but it has been suggested that biological and environmental factors may contribute to gender identity variations (Gomez-Gil et al., 2011).

There is evidence of a fraternal birth order effect, whereby the presence of older brothers increases the odds of androphilia (homosexuality) in later-born males (Blanchard, 2004). Evidence supporting the fraternal birth order effect is overwhelming, with documentation extending over several decades (Vasey & VanderLaan, 2007). Birth order and sibling sex ratio analysis have been conducted in the past decades. Blanchard (1997)

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examined data from 13 studies that compared homosexual men with heterosexual men, finding that homosexual men had a greater number of older brothers, but not older sisters, than did heterosexual men, based on a sample of 7,000 probands from different countries.

Bogaert (1998), in the only study of birth order and sibling sex ratio among non-White homosexuals, found that non-White homosexual men had a later birth order than non-White heterosexual men. Bogaert also found that homosexual men had an elevated sibling sex ratio of males to females. Bogaert quantified birth order using Berglin's index. Additionally, a fraternal index and a sororal index were used to evaluate possible birth order effects among brothers and sisters. Bogaert found a significant relationship between birth order and sexual orientation in this sample. Bogaert demonstrated that the observed correlations between birth order and sibling sex ratio and sexual orientation in men were not the result of biological or sociocultural factors idiosyncratic to White men. Bogaert concluded that the birth order effect was generalizable across races/ethnicities.

Previous studies have also investigated birth order among transsexual/transgender males. Western studies have consistently found that androphilic male-to-female transsexuals have a later birth order (Blanchard, 1997; Blanchard & Lippa, 2007; Blanchard & Sheridan, 1992; Blanchard, Zucker, Cohen-Kettenis, Gooren, & Bailey, 1996; Gomez-Gil et al., 2011; Green, 2000; Jones & Blanchard, 1998; MacFarlane, 1984; Poasa, Blanchard, & Zucker, 2004; Purcell, Blanchard, & Zucker, 2000; Schagen, Delemarre-van de Waal, Blanchard, & Cohen-Kettenis, 2012; Tsoi, Kok, & Long, 1977; VanderLaan & Vasey, 2011; Vasey & VanderLaan, 2007; Zucker & Blanchard, 1994; Zucker et al., 1997; Zucker, Blanchard, Kim, Pae, & Lee, 2007). Three studies have shown late birth order in young gender dysphoric individuals (Blanchard et al., 1996; Zucker et al., 1997; Schagen et al., 2012).

Other studies have investigated the sex composition of siblings among androphilic male-to-female-transsexuals. Results indicate an excess of brothers (Blanchard et al., 1996; Blanchard & Sheridan, 1992; Gomez-Gil et al., 2011; Green, 2000; Poasa et al., 2004; Schagen et al., 2012; Tsoi et al., 1977; VanderLaan & Vasey, 2011; Vasey & VanderLaan, 2007; Zucker et al., 1997), and, in one study in South Korea, an excess of sisters (Zucker et al., 2007), among androphilic male-to-female transsexuals. Few studies have analyzed the numbers of older brothers, older sisters, younger brothers, and younger sisters among transsexuals (Gomez-Gil et al., 2011; Green, 2000; Schagen et al., 2012; VanderLaan & Vasey, 2011; 2013; Vasey & VanderLaan, 2007). Gomez-Gil et al. found that homosexual male-to-female transsexuals had significantly more older brothers than did non-homosexual male-to-female transsexuals. The two groups were not found to differ with regard to older sisters, younger brothers, or younger sisters. Green (2000) found that homosexual male transsexuals had more siblings than did heterosexual male transsexuals. Although Green observed the highest mean number of

older brothers (0.90) in the homosexual transsexual group, there was no significant difference between homosexual and heterosexual male transsexuals in the number of brothers compared with the number of sisters. Green also found that each additional brother increased the odds of a male transsexual being homosexual. Schagen et al. found significantly more older brothers and significantly fewer older and younger sisters among gender dysphoric boys than among controls. Vasey and VanderLaan (2007) found more siblings, older brothers, older sisters, and younger brothers among fa'afafine than among gynephilic males. They replicated their study with another sample and combined both samples, finding that siblings, older brothers, and older sisters were still in excess in fa'afafine compared with gynephilic males, but that the younger brother effect did not exist (VanderLaan & Vasey, 2011).

Birth order and sibling sex ratio studies of androphilic male-to-female transsexuals have been conducted mostly with white Western participants, including Canadian (Blanchard & Sheridan, 1992; Zucker et al., 1997), Dutch (Blanchard et al., 1996; Schagen et al., 2012), English (Green, 2000), Spanish (Gomez-Gil et al., 2011), and New Zealand (MacFarlane, 1984) samples. Although transsexual/transgender research efforts in non-Western countries have increased in recent years (Bartlett & Vasey, 2006; Bradford, 1983; Bozkurt et al., 2006; Coleman, Colgan, & Gooren, 1992; Jackson, 1997; Nanda, 1994; Westphal-Hellbusch, 1997; Wikan, 1977), few non-Western studies have investigated birth order and sibling sex ratio.

Existing non-Western studies of birth order and sibling sex ratio among androphilic male-to-female transsexuals studies have been conducted in Korea (Zucker et al., 2007), Singapore (Tsoi et al., 1977), and Samoa (Poasa et al., 2004; VanderLaan & Vasey, 2011, 2013; Vasey & VanderLaan, 2007). The Korean study examined sibling sex ratio and birth order, finding that male-to-female transsexuals in Korea tended to have a late birth order, but the effect of having a late birth order among both transsexuals and controls were driven by the presence of older sisters (Zucker et al., 2007). Tsoi et al. (1977) reported a late birth order in androphilic male-to-female transsexuals in Singapore, but they did not test for statistical significance and did not have a control group. The first study from Samoan fa'afafine had a very small sample and no control group (Poasa et al., 2004), but more recent studies in the country have confirmed that androphilic males have a greater number of older brothers than do heterosexual males (VanderLaan & Vasey, 2011, 2013; Vasey & VanderLaan, 2007).

The replication of these findings in cross-cultural research may reflect common underlying causal mechanisms. In this study, we aimed to explore birth order in Turkey, a country that resembles both Western and Eastern cultures. This is the first study in the Turkish population, and it is worth analyzing the results from both Eastern and Western perspectives.

Turkish culture is different from both the West and the East in many ways. First, one must look at Turkey's history and

geographical location. Being, as it were, a “bridge” between the European and Asian continents, it is inevitable that Turkey has multiple cultures blended within its borders. To take a brief look at the background of the early Turkish people, although they lived in central Asia in the first centuries, over time they migrated to the Middle East. Additionally, looking at the historical events that took place in Turkey’s geographical location, it can be understood that many ancient cultures of Anatolia underlie the basis of Turkish culture today.

Turkey’s cultural changes can be divided into three periods: the pre-Islamic period, the Islam-based ruling of the Ottoman Empire beginning in the 13th century and lasting through the end of the 19th century, and the foundation of the Turkish Republic. In this last period, many changes were made, nationwide, to adopt the Western lifestyle. The adoption of Western values has influenced the social and sexual life of the community, but this influence is not complete. The Islamic, Arabic, and Persian influences on the lifestyle in Turkey have persisted.

Although Turkey is in the process of rapid social change, the general family pattern is predominantly patriarchal. There is still a preference for sons, and this does not depend only on an economic basis. The son, especially the eldest one, is responsible for all women in the family, including his mother, in the absence of his father. In contrast to the central role of sons in the patrilocal family, daughters leave the household to get married when they reach an age to be “useful.” Looking at the family structure, when expecting children, the parents, especially the father, will desire a son. The preference for a son is still a dominant trait in Turkish families, especially in the East. Family bonds are considered to be very important, and the father is usually the authoritative figure.

Turkey is a secular state according to the constitution. Although the community is predominantly Muslim, Turkish people are unique in their mild interpretation of Islam. A number of varieties of Islamic interpretation exist side by side, as well as non-Muslim groups.

Although members of some groups organize their lives according to Islam, this cannot be generalized to the whole community. Ancient Turkish influences and Anatolian civilizations constitute the main background, and Islamic and Western influences are woven into this pattern. Thus, Turkey is a geographical and a sociocultural bridge between East and West (Aydin & Gulcat, 2003).

The fertility rate is higher in Turkey than in Western countries and Korea. The total fertility rate was 2.53 in 2000 and ranged from 1.66 to 7.06 in individual provinces (Ozgun, 2004). In the 1980s, the average fertility rate was 3.41 in Turkey. Although the total fertility rate was estimated at 2.1 in 2013 (The World Factbook Group, 2013), it decreased from 4.4 to 2.1 from 1980 to 2013 (The World Bank Group, 2014). Over the same period, the total fertility rate changed from 1.7 to 1.6 in Canada, from 2.7 to 2.0 in Korea, from 1.6 to 1.8 in the Netherlands, from 2.0 to 2.1 in New Zealand, from 1.7 to 1.2 in Singapore, and from 2.2 to 1.4 in Spain, while remaining constant at 1.9 in the United Kingdom.

The objective of the present study was to test the hypothesis that male-to-female transsexuals have a late birth order and have more brothers than sisters in a culture with a higher fertility rate compared with those in contexts examined in previous, mostly Western, studies.

## Method

### Participants

A total of 60 male-to-female transsexuals and 61 male heterosexual controls were included in the study. The mean ages of the male-to-female transsexual group and the controls were  $24.60 \pm 3.70$  (range, 19–38) and  $22.31 \pm 1.40$  (range, 20–25) years, respectively,  $t(119) = 4.52, p < .001$ . Although the difference in mean ages was statistically significant, it was small (2.29 years) in absolute terms.

The participants were evaluated during psychiatric examinations before their compulsory military service. All people who are to begin military service can demand a psychiatric examination, whether they have a history of psychiatric disorder or not. The controls were selected from consecutive participants who applied for this psychiatric examination before their compulsory military service. Some requested a psychiatric examination to be excused from the military service, some may have suffered from different psychiatric disorders (anxiety, depression, etc.), and some were healthy. The evaluation process was conducted between 2005 and 2010, and only those who wanted to join the study were included. The gender identity diagnosis was made by three or more consultant psychiatrists according to DSM-IV-TR criteria (American Psychiatric Association, 2000). We directly asked the DSM criteria, and all participants were either using cross-sex hormones and/or had undergone surgical procedures of the breasts or genitalia. All participants came to the interview wearing female clothing. Participants were also questioned about their sexual attraction, and only those who were attracted to the same biological sex (males) were included. Those who reported attraction to both sexes or to the opposite sex were excluded.

### Measures

Data on total siblings and on older and younger brothers and sisters were collected, and Slater’s (Slater, 1958, 1962) index, Berglin’s (1982) index, the fraternal index (FI), and the sororal index (SI) (Jones & Blanchard, 1998) were calculated based on these parameters.

Slater’s Index (Slater, 1962) is one of the most often used birth order indexes. Slater’s Index is the number of older siblings divided by the total number of siblings (excluding the proband himself). Slater’s Index can be calculated only for probands who have one or more siblings. If the proband has no siblings, Berglin’s Index can be used  $(\text{older siblings} + 0.5) / (\text{total siblings} + 1)$

**Table 1** The mean number of total siblings, total brothers and sisters, older brothers and sisters, younger brothers and sisters in male to female transsexuals and controls

	Transsexual M ± SD (n = 60)	Control group M ± SD (n = 61)	t(df)	p
Total number of siblings	3.47 ± 2.05 (n = 60)	2.62 ± 1.44 (n = 61)	2.63 (119)	.01
Total brothers	1.97 ± 1.37 (n = 60)	1.02 ± 0.81 (n = 61)	4.67 (119)	.001
Total sisters	1.50 ± 1.42 (n = 60)	1.61 ± 1.28 (n = 61)	−4.33 (119)	ns
Older brothers	1.32 ± 1.16 (n = 60)	0.44 ± 0.67 (n = 61)	5.09 (119)	.001
Older sisters	1.13 ± 1.32 (n = 60)	1.02 ± 1.28 (n = 61)	0.49 (119)	ns
Younger brothers	0.65 ± 0.90 (n = 60)	0.57 ± 0.74 (n = 61)	0.51 (119)	ns
Younger sisters	0.37 ± 0.76 (n = 60)	0.59 ± 0.84 (n = 61)	−1.53 (119)	ns
Siblings other than older brothers	2.15 ± 1.89 (n = 60)	2.18 ± 1.30 (n = 61)	−.10 (119)	ns
Proportion brothers	0.58 ± 0.30 (n = 59)	0.43 ± 0.36 (n = 61)	2.36 (118)	.05

(Berglin, 1982). In our study, Slater's index could be calculated for all but one subject, who was in the transsexual group.

The FI is an index measuring brothers' birth order. The FI is calculated by dividing the number of older brothers + 0.5 by the total number of brothers + 1. The SI is an index measuring sisters' birth order. The SI is calculated by dividing the number of older sisters + 0.5 by the total number of sisters + 1. The FI and SI can be calculated for all participants, including only children.

#### Data Analysis

Differences between transsexuals and controls were assessed using two-tailed independent *t* tests, with *p* values under .05 considered significant.

#### Results

Compared with controls, the transsexual group had statistically significantly higher total numbers of brothers ( $1.97 \pm 1.37$  vs.  $1.02 \pm 0.81$ ) and older brothers ( $1.32 \pm 1.16$  vs.  $0.44 \pm 0.67$ ). There were no statistically significant differences between the two groups in total number of sisters, older sisters, younger brothers, younger sisters, or siblings other than older brothers. In fact, siblings other than older brothers were very similar ( $2.15 \pm 1.89$  vs.  $2.18 \pm 1.30$ ). It can be concluded that the difference observed for total siblings was due to the effect of older brothers. This was also supported by findings for the proportion of brothers, which was calculated by dividing the total number of brothers by the total number of siblings. The mean numbers of total siblings, total brothers and sisters, older brothers, older sisters, younger brothers, younger sisters, and siblings other than older brothers, as well as the proportion of brothers are shown in Table 1.

Birth order was also analyzed using birth order indexes. In the transsexual group, Slater's index could be calculated for 59 participants. Slater's Index was  $0.74 \pm 0.31$  in the transsexual group and  $0.49 \pm 0.43$  in controls. According to Slater's Index, the male-to-female transsexual group had a later birth order than

did the control group, and this result was statistically significant. It was supposed that the normal distribution for this index is 0.5 and that the control group had a similar birth order result. By using Berglin's Index (older siblings + 0.5/total siblings + 1), we were able to include all 60 participants, and the results remained significant ( $0.66 \pm 0.21$  vs.  $0.51 \pm 0.28$ ). The Slater and Berglin indexes, the fraternal index (FI), and the sororal index (SI) are shown in Table 2.

All four indexes were higher in the transsexual group, supporting the effects of late birth order and late sibship. The number of older brothers was higher, but the numbers of older sisters, younger brothers, and younger sisters were not statistically different between transsexuals and controls. Thus, the late birth order effect seems to be related to the number of older brothers. In a detailed analysis, differences in the sums of brothers and sisters are also important to note. The total number of brothers in the transsexual group was 118; 79 of them were older, and only 39 were younger. For the control group, the total number of brothers was 62: 27 older and 35 younger. The number of older siblings was 106 for transsexuals and 74 for controls.

#### Discussion

This study confirms that, in a high-fertility context culturally influenced by both the West and the East, male-to-female transsexuals had a later birth order and more older brothers than did controls, as previous studies have shown in other contexts (Blanchard, 1997; Blanchard et al., 1996; Blanchard & Lippa, 2007; Blanchard & Sheridan, 1992; Bogaert, 1998; Gomez-Gil et al., 2011; Green, 2000; Jones & Blanchard, 1998; Poasa et al., 2004; Purcell et al., 2000; Tsoi et al., 1977; Zucker & Blanchard, 1994; Zucker et al., 2007).

Turkey's sociocultural norms share similarities and differences with both the West and the East. As was detailed in the Introduction, Turkey is a secular country whose citizens are mostly Muslim. Although some groups organize their life according to Islam, this is not true of the whole community. Islamic and

**Table 2** The Slater and Berglin indexes, sibling sex ratio, fraternal birth order, fraternal index, sororal birth order and sororal index in male to female transsexuals and controls

	Transsexual M ± SD (n = 60)	Control group M ± SD (n = 61)	t(df)	p
Slater's Index	0.74 ± 0.31 (n = 59)	0.49 ± 0.43 (n = 61)	3.73 (118)	.001
Berglin's Index	0.66 ± 0.21 (n = 60)	0.51 ± 0.28 (n = 61)	3.42 (119)	.001
FI	0.59 ± 0.24 (n = 60)	0.48 ± 0.23 (n = 61)	2.77 (119)	.01
SI	0.63 ± 0.21 (n = 60)	0.54 ± 0.25 (n = 61)	2.11 (119)	.05

FI fraternal index, SI sororal index

Western influences have been built on a foundation of ancient Turkish influences and Anatolian civilizations. This makes Turkey a sociocultural and geographical bridge between East and West. As such, attitudes toward transsexual people and various sociocultural norms are influenced by both the West and the East.

There is a double standard concerning attitudes toward male transsexuals in Turkey. On the one hand, they are alienated, ridiculed, and even persecuted by society in general, and are regarded by the police as a threat to social values. On the other hand, they are also condoned, especially by those in show business, who often publicly claim that “God had willed them to be” as they are (Aydin & Gulcat, 2003).

According to our findings, Turkish androphilic male-to-female transsexuals have a later birth order than controls, consistent with the literature. Statistically significant differences between the two groups were found using Slater's Index, Berglin's Index, the FI, and the SI. Slater's and Berglin's Indexes are the most widely-used parameters for birth order. Their averages are accepted to be 0.5, and the control group in this study had an average of 0.49 on Slater's Index and 0.51 on Berglin's Index. The transsexual group had an average of 0.74 for Slater's Index and 0.66 for Berglin's Index. In a previous study, Slater's Index was found to be 0.59 for Spanish male-to-female transsexuals (Gomez-Gil et al., 2011), compared with 0.47 for controls. Slater's Index has also been found to be higher among Samoan Fa'afafine compared with controls: 0.66 and 0.63 in two different studies (Vasey & VanderLaan, 2007; VanderLaan & Vasey, 2011). In the Korean transsexual population, Slater's Index was found to be 0.76, but the control group also had a later birth order. In our study, both indexes showed that the transsexual group had a later birth order. This study shows that, also in a higher sibling population, birth order is a predictor of the tendency toward transsexuality.

The FI was also compared between the transsexual group and the control group. Our finding of higher FI scores among transsexuals supported late birth order among brothers as a predictor of transsexuality. In previous work, the FI was found to be 0.61 in a group of Spanish male-to-female transsexuals (Gomez-Gil et al., 2011) and 0.67 and 0.65 in Samoan Fa'afafine (Vasey & VanderLaan, 2007; VanderLaan & Vasey, 2011). Our findings indicated that FI was 0.59 in a Turkish transsexual group.

The number of older brothers was statistically significantly higher among the transsexual group, compared with the con-

trols. There was no significant difference in the number of siblings other than older brothers. Numbers of other siblings, in fact, were similar. This definitely confirms that the excess of siblings found among transsexuals is related to the excess of older brothers for this group. This finding also supports previous studies. Previous work has found that the gender dysphoric had more older brothers, but not older sisters, than controls (Schagen et al., 2012).

In our study, the proportion of brothers (brothers/all siblings) was also higher in the transsexual group than in the control group. This proportion was previously found to be 0.57 in a gender-dysphoric homosexual group (Blanchard et al., 1996) and 0.55 in a group of Spanish male-to-female transsexuals (Gomez-Gil et al., 2011).

In the present study, the total number of brothers was 118, and the total number of sisters was 62 in the transsexuals group. There were 79 older brothers and 39 younger brothers, in total. This confirms the results of previous studies finding that transsexuals have more older brothers than do others (Blanchard et al., 1996; Blanchard & Sheridan, 1992; Blanchard, Zucker, Bradley, & Hume, 1995; Gomez-Gil et al., 2011; Green, 2000; Poasa et al., 2004; Schagen et al., 2012; Vasey & VanderLaan, 2007; VanderLaan & Vasey, 2011; Zucker et al., 1997).

In our study, differences in the mean numbers of total sisters, older sisters, younger sisters, and younger brothers between the transsexual and control groups were not statistically significant. This is similar to the findings of previous studies (Gomez-Gil et al., 2011; Green, 2000; Schagen et al., 2012). However, Vasey and VanderLaan (2007) found more older brothers and older sisters among Samoan fa'afafine compared with gynephilic males.

This study provides further support that late birth order and having more older brothers are biodemographic variables associated with male-to-female transsexuality. This may provide support for the maternal immune reaction hypothesis that the immune reaction during pregnancy increases behavioral feminization and the possibility of transsexuality (Blanchard, 2008; Gomez-Gil et al., 2011; Green, 2000; MacCulloch & Waddington, 1981). The immune effect is hypothesized to cause an alteration in (some) later born males, and this may be related to an immune response targeting molecules on the surface of male fetal brain cells (Bogaert & Skorska, 2011). Although we are still far from being able to explain this replicated finding of late birth order of transsexuals,

other work has shown that this fraternal birth order effect is prenatal in origin (Bogaert, 2006).

Our study had the following limitations. First, the transsexual participants were under observation between 2005 and 2010, but the controls were interviewed in 2010. The number of siblings might have been affected by this difference in the period of study. Second, the transsexual group consisted only of those who were attracted to the same biological sex (males). Other transsexuals were too few for statistical analysis and were therefore not included in the study.

In conclusion, supporting a possible underlying biological causal mechanism, this study found that androphilic male-to-female transsexuals in Turkey, a country with relatively high fertility and with a different cultural context from those previously investigated, have a later birth order and have more older brothers compared with a control group in Turkey.

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