

A CORRELATIONAL STUDY ON THE NEURODEVELOPEMENTAL  
THEORIES OF HUMAN SEXUALITY

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By

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## **ABSTRACT**

Human sexuality has long been a contentious issue in both academic and clinical environments, as well as in the general population. In fact, it was only 42 years ago, that homosexuality was removed as a psychological disorder from the Diagnostic and Statistical Manual of Mental Disorders, Version III. Previous scientific investigations have focused largely on the nature versus nurture debate, with more recent theories taking a neurodevelopmental approach. The current study explores existing neurodevelopmental theories and factors related to sexual preference in young adults.



## I. INTRODUCTION

In the late 1990's, renowned sexologist and psychologist Dr. Ray Blanchard published an article entitled "Birth order and sibling sex ratio in homosexual versus heterosexual males and females", which described the Fraternal Birth Order Effect. Blanchard describes the birth order effect thusly "...homosexuality in males is predicted by higher numbers of older brothers, but not by higher numbers of older sister, younger brothers or younger sisters" (Blanchard et al, 2006). Blanchard believes the cause of this phenomenon is the presence of certain proteins (called H-y antigens) in pregnant mothers, which react increasingly with each male fetus the mother produces (Blanchard et al, 2006)

The Fraternal Birth Order Effect has been a main contender as solid scientific evidence that homosexuality is a biological phenomenon. Previous research also explores the possibility of environmental influences as a factor in determining same-sex attraction. However, it is important to mention that homosexuality is speculated to be a result of a combination of biological factors and environmental factors. I believe that this is what makes this topic so multi-faceted and often subjective. The nature versus nurture debate remains alive and well when it comes to scientific attempts to explain same sex attraction.

The overarching purpose of this thesis was to further the research of the growing LGBTQT community, in hopes to shed further light on the genetic and environmental factors that may be associated with homosexuality. I strive to do this objectively, and through the lenses of psychology. As I believe that, all science should be held to the

standard of hard evidence, while remaining free of personal or cultural influence. In addition to questions related to Blanchard's theory, participants were also questioned about their relationship with their mother and father. These questions were included based on no previous research data, but rather, this information allows a better characterization of the social environment in which participants developed, a relevant issue in a study of neurodevelopmental processes. Before testing Blanchard's theory, some background information is needed to understand the history of the impact of homosexuality on science and culture.

### **History of Homosexuality**

It is rare that a single era, a phenomenon spans its influence into so many categories of our world. Homosexuality has been seen as a disease, it has been seen as a lifestyle, and as a scientific term. It has been the cause of disgrace, sin, fascination, and of pride.

The timeline of homosexuality in human culture is a colorful one. Some of the earliest recorded "homosexuality" is documented in the Greek culture, such as in the dialogues of Plato, and Greek art (Picket, 2002). Christianity has certainly influenced our American 20<sup>th</sup> century viewpoint on gay sex. In early American colonies harsh criminal consequences were given for acts of "sodomy". Sodomy is a term which is used to describe any sexual act that is seen as "non-procreative", and gay sex fell under this description (Herek, 2016). As premarital sex became more prevalent, so did engaging in sex with the same gender (Picket, 2002). Early Psychologists, Sigmund Freud and Havelock Ellis both took psychological stances with homosexuality. Ellis believed that a person's sexual orientation was innate rather than an acquired characteristic, suggesting

that it was not a psychiatric disorder (Herek, 2016). To the contrary, Sigmund Freud believed that humans are born bisexual, and that they become either homosexual or heterosexual based on their life experiences (Herek, 2016). In a famous letter to his mother, Freud wrote:

*Homosexuality is assuredly no advantage, but it is nothing to be ashamed of, no vice, no degradation, it cannot be classified as an illness; we consider it to be a variation of the sexual function produced by a certain arrest of sexual development. Many highly respectable individuals of ancient and modern times have been homosexuals, several of the greatest men among them (Plato, Michelangelo, Leonardo da Vinci, etc.). It is a great injustice to persecute homosexuality as a crime, and cruel too.*

However, the views of Freud and Ellis that homosexuality should not be viewed as a problem, did not last very long. Sandor Rado, a later psychoanalyst, speculated that homosexuality was unnatural. He viewed homosexual acts as an attempt to achieve sexual pleasure when heterosexual sex was unavailable (Herek, 2016). These mentioned individuals are categorized as psychoanalyticians, they did not base their assumptions on empirical data but rather on observation and personal theories. The first individual who constructed empirically based research on homosexuality was Alfred Kinsey (Herek, 2016). Kinsey was a zoologist and taxonomist who studied human sexual behavior. In his

research he discovered that a magnitude of his participants had engaged in sexual activity with persons of the same gender (Herek, 2016). Although today his data cannot be accurately assessed, it illustrated to Kinsey the prevalence of homosexuality. Previous to Kinsey, researchers assumed that homosexuality was confined to a small handful of individuals, but Kinsey's data was showing otherwise. As years passed, the field of psychology was confronted with more and more data suggesting that homosexuality was not a mental disorder.

After the 1960's the gay right's movement was well noticed in the public arena. Within the next few decades, most college campuses had gay and lesbian organizations. In 1973, The American Psychiatric Association removed homosexuality from its official listing of mental disorders. This was a huge milestone in changing our cultural perspective on homosexuality.

The field of Psychology now officially recognizes that homosexuality is not a disease that requires treatment. Despite progressive efforts, anti-gay murders are still prevalent. According to the Huffington post, anti-gay murders hit a record high in the year 2011 (Shapiro, 2012). According to the CDC's website, "...lesbian, gay, and bisexual youth were more than twice as likely to have attempted suicide as their heterosexual peers." These statistics on LGBT youth are staggering, and demand attention. I believe that it is the responsibility of science to address urgent issues affecting our world. Only through understanding and education will acceptance slowly replace prejudice, when it comes to LGBT issues

### **Social and Psychological issues of Homosexuality**

The year 2016 was another milestone for the homosexual community, with gay marriage being legalized by the U.S. Supreme Court. However, although strides have been made towards social acceptance of homosexuality, discrimination still exists. In an article by Dr. Michael Friedman Ph.D. published in Psychology Today, Titled: *The Psychological Impact of LGBT Discrimination*, Friedman discusses some of the negative psychological impacts the LGBT population faces. Friedman writes, “Discrimination against LGBT people is commonplace. Gay, lesbian or bisexual people are 10 times more likely to experience discrimination based on sexual orientation as compared to heterosexual people. Mistreatment comes in many forms, from seemingly benign jokes, to verbal insults, unequal treatment and in the most extreme cases, physical violence”. According to Friedman, laws allowing for equal rights for LGBT individuals would improve their mental health. An example of one of these laws is the marriage equality law, recently passed by the Supreme Court in 2015. Although laws only facilitate legal equality, they do foster equality in a cultural perspective.

### **Scientific Studies of Homosexuality**

The National Bureau of Economic Research estimates that nearly 20 percent of the US population has had some attraction to the same gender (Koffman et al., 2013). However, it was only 42 years ago that homosexuality was removed as a psychological disorder from the Diagnostic and Statistical Manual of Mental Disorders, Version III. As thinking has advanced, several theories have emerged regarding the development of sexual preference. Early work in this area took a nature versus nurture approach and focused almost exclusively on males (Kruse, 1985). Studies of the “nurture” aspect of the development of human sexuality tended to focus on parent-child relationships,

particularly the powerful relationship between a male child and his mother. Though many early researchers hypothesized that the male child-mother relationship would be all-important, results ultimately indicated that this relationship is not of primary importance in the development of male sexual preference (Robertson, 1972). A more recent exploration of this idea found that although children from lesbian families were more likely to explore same-sex relationships, the large majority of children who grew up in lesbian families ultimately identified as heterosexual (Golombok & Tasker, 1996). More biological (“nature”) research in humans and animal models suggested that sexuality and sexual preference may be related to prenatal hormonalization, as well as postnatal socialization effects (Money, 1987).

### **Fraternal Birth Order Effect**

As mentioned previously, Blanchard’s theory of the Fraternal Birth Order Effect, which has also been referred to as the Maternal Immune Hypothesis, suggests that there is a positive correlation between the number of older brothers a man has and the probability of homosexuality (McConaghy et al., 2006). In fact, some studies note that each additional older brother increases the odds of homosexuality by 33% (Blanchard, 2001). This phenomenon is thought to reflect the progressive immunization of some mothers to Y-linked minor histocompatibility antigens (H-Y antigens) by each succeeding male fetus; that is, the maternal immune hypothesis (Blanchard, 2001). These anti-H-Y antigens then pass through the placental barrier to the fetus, affecting aspects of sexual differentiation in the fetal brain that increase the odds of homosexuality in male offspring (Blanchard, 2001). Evolutionary biologists have noted that gay men have low reproductive output (having children at about 20% the rate of heterosexual men) and that

sexuality appears to be substantially heritable and may have specific genetic loci (see Rahman & Hull, 2005).

### **The Kin Selection Theory**

Another idea that has recently received attention is the Kin Selection Theory, which posits that homosexuality has remained in our species due to homosexual individuals channeling their resources to their next closest of kin, in turn giving that bloodline which contains their DNA a better chance of survival (Bobrow et al., 2001). In other words, kin selection proponents suggest that homosexual men reproduce not directly, but indirectly, through aid given to relatives (Bobrow et al., 2001). However, a recent empirical test of this theory in a community sample (Rahman & Hull, 2005) found no significant differences between heterosexual and homosexual men (aged 18 to 36; mean age around 24 years in both groups) in measures of general familial affinity, generous feelings, and benevolent tendencies. Rahman and Hull (2005) noted that these remained non-significant even after co-varying for level of personal income, psychological gender, and interest in children. The topic of kin selection would be relevant to the theme of this thesis project; however, inclusion of evolutionary theories of sexuality was beyond the scope of our current study.

In conclusion, current theories address both nature (genetic, immunological, brain organization) and nurture (relationships with kin, family environment); however, the literature remains contentious with regard to factors influencing human sexual preference, and a number of issues remain to be addressed. For instance, the vast majority of studies have focused on males – homosexual versus heterosexual. Very few studies have considered the neurodevelopmental history of lesbians and bisexuals.

## **Specific Aims and Hypotheses of Thesis Project**

The ultimate goal of this research is to explore the relevance of existing neurodevelopmental theories of sexuality to the growing LGBTQ community and to explore potential genetic and environmental factors associated with human sexuality.

The first aim of this research project was to test Blanchard's Fraternal Birth Order Effect in a large, collegiate population of men and women. Sexuality was examined two ways. Categories of heterosexual versus homosexual or bisexual were compared, and a continuous variable was also created using a questionnaire based on the Kinsey Scale. If Blanchard's theory is correct, then we would expect to find that presence of an older male sibling would significantly predict sexual orientation group for men (male siblings associated with homosexual or bisexual preference), but not for women. Similarly, we would expect that compared to women of either sexual orientation group, homosexual or bisexual men would report a greater number of male siblings who were born before them. In addition, the continuous approach might be expected to show a relationship between number of older male siblings and ratings on the Kinsey Scale, such that a greater number of older male siblings would be related to homosexuality or bisexuality.

A secondary aim of the study was to characterize parent-child relationships for these participants and to determine whether or not these variables correlated with Kinsey Scale scores (continuous variable approach) or if the sexual orientation groups differed on parent-child variables.

## **II. Method**

### **Participants**



A total of 794 undergraduate students between the ages of 18 to 25 complete the study. Of the 794, 164 were males and 630 were females. Within the male category, 47 of the males identified as homosexual. Within the female category 122 identified as homosexual. Participants were recruited via email through psychology classes and awarded extra credit as an incentive for completing the survey. The online survey was completed through Qualtrics. Data were collected anonymously. LBGTQ students were oversampled from campus organizations using word-of-mouth recruitment and received monetary compensation for participation. The monetary compensation was made possible by the S.U.R.F. (Student Undergraduate Research Fund) grant, funded through the Honors College. Each LBGTQ participant received \$10.00 for completing a survey which consisted of about 60 questions.

The survey included basic demographic questions, such as age, sex, education and race. Recruitment targeted between the ages of 18-25 years old. Most participants were undergraduates, but some graduate students were included. All participants electronically signed a consent form before completing the survey. Subjects were aware of the nature of the survey questions, and told that all answers were to remain completely confidential. As with all research participants, particularly research which focuses on a culturally sensitive topic such as homosexuality.

### **Questionnaires**

A complete collection of survey questions is listed in the appendix section of this thesis. Two methods were used to examine sexuality. In one method, participants categorized themselves as heterosexual, homosexual or bisexual. In a second method, a continuous sexuality score was derived using questions based on the Kinsey Scale, which

placed individuals on a spectrum of 0 (exclusively heterosexual) to 6 (exclusively homosexual), see Table 1. Questions in this scale focused on participants' sexual histories and responses to hypothetical sexual encounters. A copy of the scale is at (<http://vistriai.com/kinseyscaletest/>).

Questions pertaining to the male birth order effect were based on the work of Blanchard and colleagues (2006). We asked birth order questions by using a grid method that required the participants to describe their nuclear family. This grid allowed us to determine the participant's position in the family birth order and the time between births of various family members. Question about parent-child relationships were created by the author (K. Wickham) and focused on participants' perceptions of parental control and confidence, as well as the extent to which parents encouraged participation in activities traditionally considered to be masculine or feminine.

Figure I.

*Description of Kinsey Scale Levels.*

<b>RATING</b>	<b>DESCRIPTION</b>
<b>0</b>	Exclusively heterosexual
<b>1</b>	Predominantly heterosexual, only incidentally homosexual
<b>2</b>	Predominantly heterosexual, but more than incidentally homosexual
<b>3</b>	Equally heterosexual and homosexual
<b>4</b>	Predominantly homosexual, but more than incidentally heterosexual
<b>5</b>	Predominantly homosexual, only incidentally heterosexual
<b>6</b>	Exclusively homosexual
<b>X</b>	Asexual, Non-sexual

*Note.* Modeled after: <http://www.kinseyinstitute.org/research/ak-hhscale.html>

### **Data Analysis**

Continuous demographic variables (such as age) were analyzed using 2 (sexual orientation group: heterosexual versus homosexual or bisexual) by 2 (gender: male versus

female) ANOVAs. Dichotomous demographic variables (such as race/ethnicity: Caucasian versus not Caucasian) were analyzed by Chi-Square.

**Birth Order.** *Categorical Approach.* To address the question of potential birth order effects on sexuality, separate logistic regression analyses were conducted for males and females using presence versus absence of older male siblings and age as predictors of sexual orientation (heterosexual versus homosexual or bisexual). Next, to determine whether or not these sexual orientation groups differed with respect to the *time gap* between their birth and the birth of the older male sibling, separate ANCOVAs (controlling for age) were conducted for males and females who had reported an older male sibling born immediately before them.

*Continuous Approach.* First, participants were grouped according to the number of male siblings born to their family before them. This created three groups: 1) no male siblings born before, 2) one male sibling born before, 3) two or more male siblings born before. Next, an ANCOVA (controlling for age) was conducted gender (male versus female) and male sibling group (none, one, two or more) as the between-subject factors and Kinsey Scale score as the dependent variable.

**Parent-Child Relationships.** *Categorical Approach.* To address the question of whether or not parent-child relationships differed in the sexual orientation groups (heterosexual versus homosexual or bisexual), ANCOVAs (controlling for age) were conducted with sexual orientation and gender as between-subject factors and individual parent-child relationship items as the dependent variable.

*Continuous Approach.* Partial correlations (controlling for age) were conducted for the entire participant sample (collapsed across gender) to detect potential relationships

between responses to the parent-child relationship items and Kinsey Scores. The analysis was also repeated separately in male and female participants.

### III. Results

#### Demographics

For age, there was a significant main effect of sexual orientation group ( $F(1,790) = 18.88, p < .001$ ), see Table 2. The homosexual or bisexual group was older than the heterosexual group. There was also a significant main effect of gender ( $F(1,790) = 15.68, p < .001$ ). Males were older than females. The interaction of sexual orientation and gender on age was not statistically significant. Participant groups did not differ on the percentage of participants who indicated “Caucasian” as their race/ethnicity. Likewise, there were no group differences on the percentage of participants who reported having an older male sibling.

Table I.

*Demographic characteristics of participants.*

	Male		Female	
	Heterosexual ( <i>n</i> = 117)	Homosexual or Bisexual ( <i>n</i> = 47)	Heterosexual ( <i>n</i> = 508)	Homosexual or Bisexual ( <i>n</i> = 122)
Age*	19.4 (1.5)	19.8 (1.6)	18.7 (1.1)	19.4 (1.7)
% Caucasian	54%	55%	60%	48%
% Older Male Sibling	33%	43%	33%	29%

### Birth Order Effects

For males the presence versus absence of older male siblings and age were not significant predictors of sexual orientation (heterosexual versus homosexual or bisexual). For females: presence versus absence of older male siblings was not a significant predictor, however, age was a significant predictor ( $Wald \chi^2(1) = 27.40, p < .001$ ) with older women being more likely to identify as homosexual or bisexual. Further, the time gap between births of participants and their older male siblings did not differ between sexual orientation groups (See Table 3).

Table II.

	Male		Female	
	Heterosexual ( <i>n</i> = 45)	Homosexual or Bisexual ( <i>n</i> = 28)	Heterosexual ( <i>n</i> = 258)	Homosexual or Bisexual ( <i>n</i> = 61)
Years between births (older male sibling)	4.1 (3.9)	4.3 (2.5)	4.4 (3.1)	4.5 (3.3)

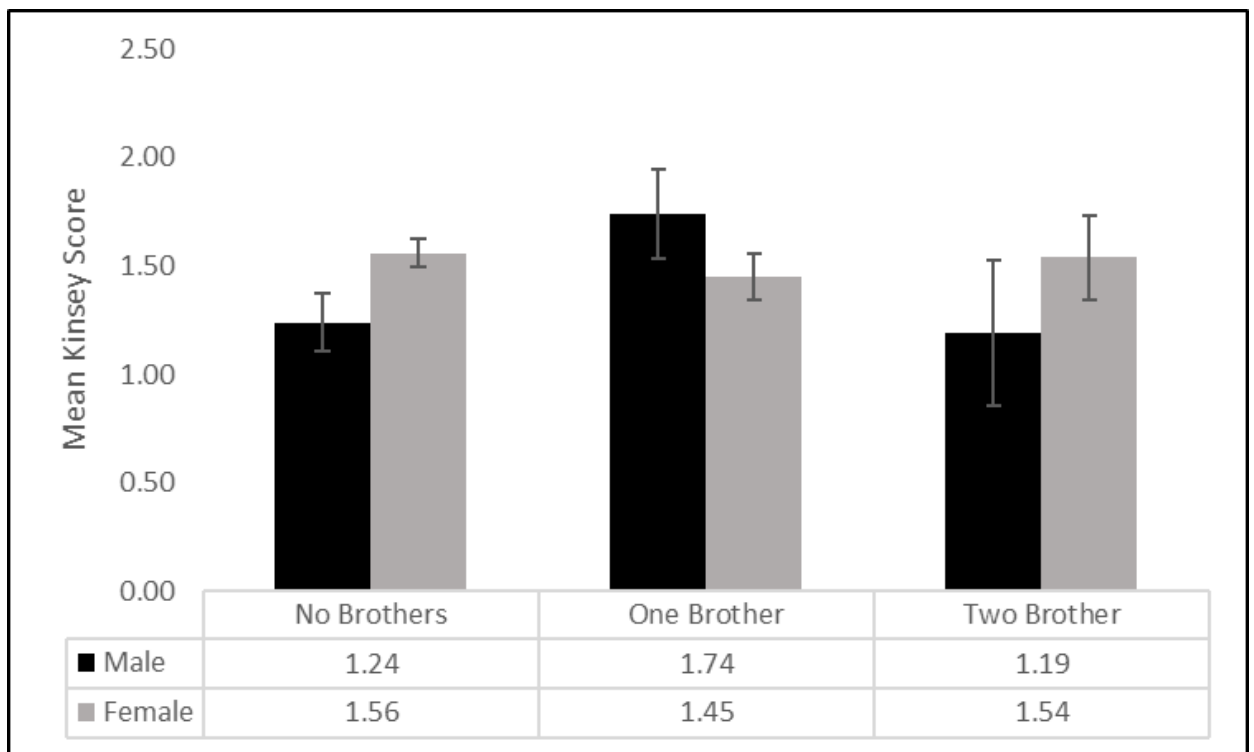
*Time gap between birth of participants and their older male sibling.*

Next, ANCOVA results (controlling for age) indicated no significant main effect of the number of male siblings born before the participant on Kinsey Scale scores. Likewise, there was no main effect of gender on Kinsey Scale scores and no interactions of number of male siblings by gender. Means and standard deviations for this analysis are shown in Figure II.

Figure II

*Kinsey Score's Relationship to Number of Brothers*

Note. Kinsey Scale scores did not differ by gender or number of male siblings born before the participant. Higher Kinsey Scores indicate greater endorsement of homosexuality (range from 0 = totally heterosexual to 6 = totally homosexual).



**Parent-Child Relationships**

Significant main effects of gender were noted for the participants' mothers encouraging them to engage in masculine activities ( $F(1,788) = 92.80, p < .001$ ; males

greater endorsement than females) and for father's encouraging masculine activities ( $F(1,788) = 92.80, p < .001$ ; males greater endorsement than females). There were no effects of sexual orientation group or interactions of gender and sexual orientation group for these items. Likewise, a significant main effect of gender was noted for the participants' fathers encouraging them to do feminine activities ( $F(1,785) = 351.38; p < .001$ ). There were main effects of both gender ( $F(1,788) = 384.02, p < .001$ ; females greater endorsement than males) and sexual orientation ( $F(1,788) = 8.31, p = .004$ ; homosexual or bisexual greater endorsement than heterosexual) for participants' mothers encouraging them to do feminine activities.

Significant main effects of gender were noted for participants' mothers encouraging them to "be like mom" ( $F(1,788) = 14.11, p < .001$ ; females greater endorsement than males) and for participants' mothers encouraging them to "be like dad" ( $F(1,786) = 37.17, p < .001$ ; males greater endorsement than females). In addition, a significant main effect of sexual orientation was noted for maternal encouragement to "be like dad" ( $F(1,786) = 10.22, p = .001$ ; heterosexual greater endorsement than homosexuals or bisexuals).

Significant main effects of gender were noted for participants' fathers encouraging them to "be like dad" ( $F(1,787) = 28.44, p < .001$ ; males greater endorsement than females) and for participants' fathers encouraging them to "be like mom" ( $F(1,787) = 23.10, p < .001$ ; females greater endorsement than males). No significant effects of sexual orientation or interactions of sexual orientation and gender were noted for these items.

Analysis of items pertaining to participants' views of parental confidence and control revealed the following. Compared to females, males were more likely to endorse the idea that their mother was confident ( $F(1,788) = 6.13, p = .01$ ) and controlling ( $F(1,788) = 4.25, p = .04$ ); however, there were no significant effects of sexual orientation or interactions of sexual orientation by gender for these variables. For the item "...was your father confident?" an interaction of gender by sexual orientation was noted ( $F(1,788) = 4.09, p = .04$ ); see Figure 2. Follow-up analyses indicated that this interaction was driven by a significant effect of sexual orientation in the male group, such that heterosexual men were more likely to report confident fathers compared to homosexual or bisexual men ( $p = .02$ ). All other comparisons were non-significant.

Finally, the continuous approach to the analysis of the potential relationship between parent-child items and sexuality revealed a significant positive correlation between the item "...did your mother encourage you to "be like dad"?" and Kinsey scale scores in the entire participants sample (collapsed across gender),  $r(784) = .08, p = .02$ . Participants who reported that their mother encouraged them to be like their father tended to have lower scores on the Kinsey Scale, reflecting a more heterosexual orientation. All other correlations were below the level of statistical significance. When these analyses were repeated separately in male and female participants, no significant relationships were noted between the parent-child items and Kinsey Scale scores for males or for females

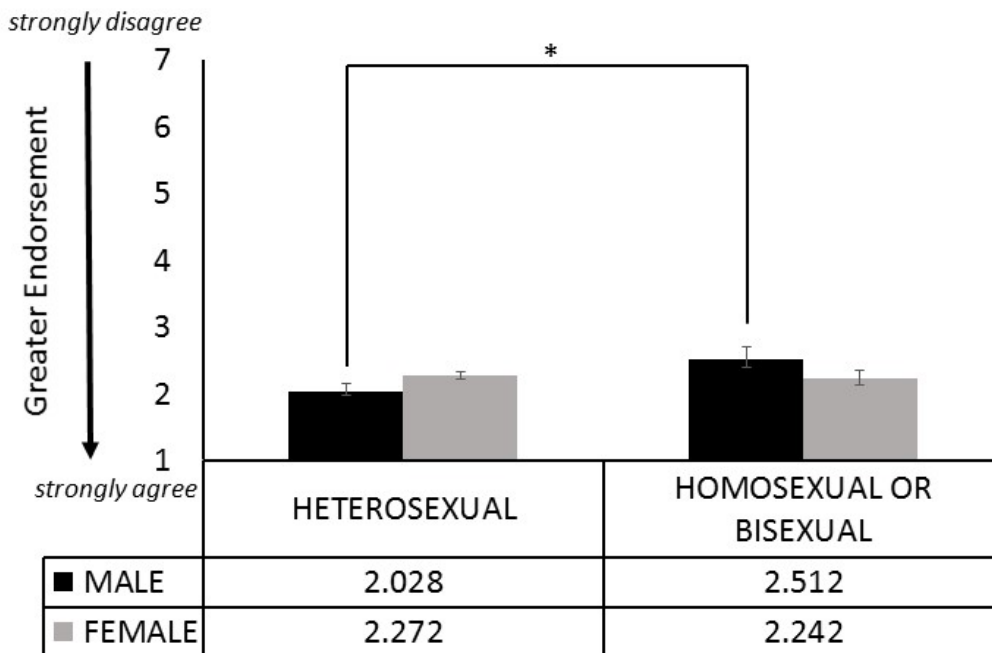


Figure III.

*Father Confidence Data*

Note. For the question “When you were growing up, was your father confident?” there was a significant interaction of sexual orientation and gender group, in which heterosexual men were more likely to report confident fathers compared to homosexual or bisexual men. All other differences were non-significant. Lower scores indicate greater endorsement.

### When you were growing up, was your father confident?



#### IV. Discussion

Homosexuality remains a multifaceted issue. This thesis project focused on testing one potential neurodevelopmental hypothesis (the Fraternal Birth Order Effect) of

human sexuality. Previously, research in this area had focused predominantly non-collegiate male participants. The current study included college-aged men and women who identified as heterosexual, homosexual or bisexual. The results of this study failed to confirm Blanchard's Fraternal Birth Order Effect, which would have predicted that homosexual or bisexual males (but not females) would be more likely to have older brothers born before them. Instead, results indicated that age, but not presence versus absence of older male siblings, was the only significant predictor of sexual orientation for women. Older women were more likely to identify as homosexual or bisexual. Neither predictor (age nor older male siblings) was significant for males. A second analysis indicated that the time gap between births of participants and their older male siblings were also not related to sexual orientation.

Physiologically and psychologically, Males and females mature at different rates (Rogol, Clark and Roemmich, 2000). The participants in the thesis study were in late adolescence / emerging adulthood, which may partially explain why age was a significant predictor for females (older women were more likely to identify as homosexual or bisexual) but not for males. The women in this study may have been more mature in terms of their sexuality, compared to the males. However, previous studies suggest that women tend to come out to themselves and others at a later age compared to men (Groves, Bimbi, Nanin, and Parson, 2006). If females are thought to mature earlier than males, then it would be predicted that females might also come out sooner.

In an article exploring gender differences by Dr. Roy Baumeister, it is suggested that women are more influenced than men when it comes to issues of society and culture (2000). Baumeister argues that men typically have more power in our current institution,

and that gender roles for a women are more powerful then they might be for men (Baumeister, 2000). This would support our data that age is a predictor for sexuality. Perhaps women are less inclined to comeout at an early age because of societal pressures and expectation on them.

In this thesis, parent-child relationships were also studied to better characterize the developmental experiences of the participants sample. For most variables, results were in the predictable direction. For instance, while they were growing up, males (compared to females) were more likely to be encouraged by both parents to engage in masculine activities. For most variables, main effects of sexual orientation group were non-significant. There were some exceptions. For instance, homosexual or bisexual participants of both genders were more likely to have mothers who encouraged them to do feminine activities. The cause for this might be mothers may have tried to persuade their homosexual daughters to engage in more feminine activities, as a way of compensating for masculine tendencies arising in the daughters. For the men in this study, their mothers may have been more accepting of their sons engaging in activities which were traditionally considered to be femenine.

Additional analyses revealed that participants' views of parental confidence and control differed between sexual orientation groups. For instance, heterosexual men (compared to homosexual or bisexual men and women of either sexual orientation group) were more likely to report that their fathers were "confident". A son perceiving their father as confident would most likely look up to their father or see their father as a role model. The thought of dissapointing a respected and admired father could lead these sons to avoid coming out until later in life. If this was the case, then a longitudinal study of the

heterosexual men with “confident” fathers would show more men in this category coming out later in life.

### **Strengths and Limitations**

The limitations of this study would include the age of the participants. The study only focused on college age individuals (18-25 years of age). Because age was a significant predictor of sexual orientation for women but not men, a longitudinal design study that followed these participants’ sexual orientation over their lifetimes could prove insightful.

In the study, we did not consider asking the participants about their parents’ sexuality. There could be a correlation between the parents’ sexuality and the sexuality of their children. Even if the parents were not homosexual themselves, their attitudes about homosexuality may still effect the sexuality of their children. Questions such as these could shed further light on the parent-child relationship results.

### **Future Research**

Further attention should be given to the relationship between self-reported sexuality and age. All of our participants were college aged (18-25), which could have effected their self-reported sexuality. Participants could have possibly not been old enough to have an accurate understanding of their sexuality. In future studies, choosing older participants may prove to have higher rates of homosexuality. Because age was a significant factor in self-reported sexuality in this study, future work with a longitudinal design might provide more insight into birth order and sexuality.

## **V. CONCLUSION**

In the current study, the Fraternal Birth Order Effect was not supported by either categorical or continuous data analysis approaches in this sample of young men and women. Age, rather than presence or absence of older male siblings, significantly predicted sexual orientation for women (older women were more likely to identify as homosexual or bisexual) but not for men. Sexual orientation groups were similar on most, but not all, of the parent-child questions, which referred to developmental relationships. In conclusion, human sexuality is a complex issue that warrants further research.

## Demographics questionnaire

### Questions created by the applicant and faculty research advisor:

Read each of the following statements about family interactions. For each, use the listed scale to rate the strength of your agreement or disagreement with that statement in relationship to your family. For family focus on your primary family while you were growing up.

Provide a rating from 1 to 7, using the following scale:

1 = strongly agree, 2 = agree, 3 = somewhat agree, 4 = neither agree nor disagree,  
5 = somewhat disagree, 6 = disagree, 7 = strongly disagree

1. Growing up, did your mother encourage you to do masculine activities?
2. Growing up, did your father encourage you to do masculine activities?
3. Growing up, did your mother encourage you to do feminine activities?
4. Growing up did your father encourage you to do feminine activities?
5. Growing up, did your mother encourage you to “be like your mom”?
6. Growing up, did your mother encourage you to “be like your dad”?
7. Growing up, did your father encourage you to “be like your father”?
8. Growing up, did your father encourage you to “be like your mother”?
9. Growing up, was your mother confident?
10. Growing up, was your mother controlling?
11. Growing up, was your father confident?
12. Growing up, was your father controlling?

### 1. Family Relationship Scale

Bobrow, D., Bailey, J.M. (2001). Is male homosexuality maintained via kin selection. *Evolution and Human Behavior*, 22, 361-368.

2. Kinsey Scale

Kinsey, A.C., Pomeroy, W.B., & Martin, C.E. (1948). *Sexual behavior in the human male*. Philadelphia and London: Saunders.

Please evaluate the following statements as either true or false were you to say them.

I have never felt sexual desire.

True.  False.

I can not decide what sex I am attracted to more.

True.  False.

I find the idea of having sex with another ["man" if male, "woman" if female] repulsive.

True.  False.

I wouldn't want to die without having experimented sexually with both men and women.

True.  False.

I have no interest in sexual intercourse with anyone.

True.  False.

The gender composition of an orgy would be irrelevant to my decision to participate.

True.  False.

I avoid watching ["gay" if male, "lesbian" if female] pornography.

True.  False.

I can be sexually attracted to anyone in the right circumstances.

True.  False.

I have always been extremely confident in my sexual orientation.

True.  False.

I find ["men" if male, "women" if female] more attractive than ["women" if male, "men" if female].

True.  False.

I would find a threesome with a couple awkward specifically because of the presence of the ["man" if male, "woman" if female].

True.  False.

I am only attracted to ["women" if female, "men" if male].

True.  False.

I am sexually submissive.

True.  False.

Scoring: assign 1 for "true" and 0 for "false" and participants will fall into one of these categories:

0	Exclusively heterosexual.
1	Predominantly heterosexual, only incidentally homosexual.
2	Predominantly heterosexual, but more than incidentally homosexual.
3	Equally heterosexual and homosexual.
4	Predominantly homosexual, but more than incidentally heterosexual.
5	Predominantly homosexual, only incidentally heterosexual.
6	Exclusively homosexual.
X	Non-sexual.
F	The test failed to match you to a Kinsey Type profile. Either you answered some questions wrong, or you are a very unusual person.

•

This test is not infallible, if you think that your result is wrong you are right and this test is wrong.

Bogaert, A. F., & Blanchard, R. (1996). Handedness in homosexual and heterosexual men in the Kinsey interview data. *Archives Of Sexual Behavior*, 25(4), 373-378. doi:10.1007/BF0243758

- 1) What year were you born?
- 2) What is your age?
- 3) What is your sex?
  - Male
  - Female
- 1) What is your education?
  - Less than grade 8
  - Grade 8
  - Grade 9-11
  - High school graduation
  - College diploma
  - University- bachelor's degree
  - Graduate or professional degree
- 2) What was your father's education?
  - Less than grade 8
  - Grade 8
  - Grade 9-11
  - High school graduation
  - College diploma
  - University- bachelor's degree
  - Graduate or professional degree



- 3) What is your height?  
\_\_\_\_\_ cm (metric system) or  
\_\_\_\_\_ ft. \_\_\_\_\_ inches (English system)
- 4) What is the most you have ever weighed in your life?  
\_\_\_\_\_ kg (metric system) or  
\_\_\_\_\_ lb. (English system)
- 5) What is your race?
- White
  - Oriental
  - Black
  - East indian
  - Native Canadian
  - Filipino
  - Other
- 6) What's your sexual orientation?
- Heterosexual
  - Bisexual
  - Gay (homosexual)
- 7) What adult female had the greatest responsibility for raising you?
- Biological mother (the women who gave birth to you)
  - Adoptive mother
  - Foster mother
  - Stepmother
  - Other female relative
  - Other female nonrelative
  - Never raised by any adult female

Have you had sufficient contact with your biological mother to be reasonably certain how many other children she gave birth to?

- Yes
- No

In the remainder of this questionnaire, the word mother always refers to your biological mother (the women who gave birth to you), and the word father always refers to you biological father (not your adoptive, foster, or stepfather).

- 8) How many boys did your mother give birth to before she had you?  
\_\_\_\_\_ Older brothers
- 9) How many girls did your mother give birth to before she had you?  
\_\_\_\_\_ Older sisters

- 10) How many boys did your mother give birth to after she had you?  
\_\_\_\_\_ Younger brothers
- 11) How many girls did your mother give birth to after she had you?  
\_\_\_\_\_ Younger sisters
- 12) How many sets of twins did your mother have?  
\_\_\_\_\_ Sets of twins
- 13) Did you have a twin?
- No
  - Yes – identical twin
  - Yes – fraternal twin brother
  - Yes - fraternal twin sister
- 14) If your mother had children besides you, how many of these had the same father as yourself? *If she had no other children, write “NA” (for “Not Applicable”) in the box.*  
\_\_\_\_\_ Full brothers and sisters
- 15) If your mother had any children before she had you, what was the sex of the last child born before you?
- Male (1)
  - Female (2)
  - Not applicable (3)
- 16) If you answered “1” or “2” to the last question, then how many years before you was that child born? *If you answered “3” to the last question, write “NA” in the box.* \_\_\_\_\_ Years

17) On the next page, you will be asked to list each child that your mother gave birth to. Write down only their first names, nicknames, or initials. These names will not be recorded. This is just to help you keep track of who's who when writing down the rest of your answers. If you prefer, you can erase or scratch out these names after you have finished filling out the questionnaire.

Order of birth (1= first born )	First name, nickname, or initials	Present age, or age they would be if alive	Deceased (if yes, write age they died. If no, write N.)	Sex (M or F)	Twin (Y or N)	Same father as yourself (Y or N)	Ever legally married, or lived with someone in a heterosexual relationship (Y or N)
1	Sally	32	N	F	N	N	Y
2	Jr.	28	N	M	N	Y	Y
3	Self	26	-	M	N	-	N
4	T.J	22	5	M	N	Y	N
5	Mike	19	N	M	Y	Y	M
6	Lori	19	N	F	Y	Y	N
7	Tammy	15	N	F	N	Y	N
8							
9							

18) Please list below all children born to your mother, including yourself, and provide the requested information (age, sex etc.) on each one. Make sure you have read the brief instructions on the precious page before proceeding.  
**Please record only heterosexual (straight) relationships in the right-hand column.**

Order of birth (1= first born )	First name, nickname, or initials	Present age, or age they would be if alive	Deceased (if yes, write age they died. If no, write N.)	Sex (M or F)	Twin (Y or N)	Same father as yourself (Y or N)	Ever legally married, or lived with someone in a heterosexual relationship (Y or N)
1							
2							
3							
4							
5							
6							
7							
8							
9							



## References

Baumeister, R. (2000). Gender differences in erotic plasticity: The female sex drive as socially flexible and responsive. *Psychological Bulletin*, 126, 347-374. Retrieved May 01, 2016,

from:[https://www.researchgate.net/publication/12491861\\_Gender\\_differences\\_in\\_erotic\\_plasticity\\_The\\_female\\_sex\\_drive\\_as\\_socially\\_flexible\\_and\\_responsive\\_Psychological\\_Bulletin\\_126\\_347-374](https://www.researchgate.net/publication/12491861_Gender_differences_in_erotic_plasticity_The_female_sex_drive_as_socially_flexible_and_responsive_Psychological_Bulletin_126_347-374)

Berkey, B.R., Perelman-Hall, T., Kurdek, L.A. (1990). The multidimensional scale of sexuality. *Journal of Homosexuality*, 19, 67-88.

Blanchard R (1997). "Birth order and sibling sex ratio in homosexual versus heterosexual males and females". *Annu Rev Sex Res* 8: 27–67. [PMID 10051890](#).

Blanchard, R. (2001). Fraternal birth order and the maternal immune hypothesis of male homosexuality. *Hormones and Behavior*, 40(2), 105-114.

Blanchard, Ray, - University of Toronto Faculty of Medicine. (2014, September 28). Retrieved April 28, 2016, from [http://individual.utoronto.ca/ray\\_blanchard/](http://individual.utoronto.ca/ray_blanchard/)

David Bobrow, J.Michael Bailey, Is male homosexuality maintained via kin selection?, *Evolution and Human Behavior*, Volume 22, Issue 5, September 2001, Pages 361-368, ISSN 1090-5138, [http://dx.doi.org/10.1016/S1090-5138\(01\)00074-5](http://dx.doi.org/10.1016/S1090-5138(01)00074-5).

Deangelis, T. (2002). A New Generation of Issues for LGBT Clients: Practitioners are Seeing a New Cadre of Psychological Concerns in Their Work With Lesbian, Gay, Bisexual and Transgendered Clients. *PsycEXTRA Dataset*, 33(2). Retrieved March 28, 2016.

Elias, L.J., Bryden, M.P., Bulman-Fleming, M.B. (1998). Footedness is a better predictor than is handedness of emotional lateralization. *Neuropsychologia*, 46, 37-43.

Friedman, M. (2014, February 11). The Psychological Impact of LGBT Discrimination. Retrieved March 28, 2016, from <https://www.psychologytoday.com/blog/brick-brick/201402/the-psychological-impact-lgbt-discrimination>

Golombok, S., Tasker, F. (1996). Do parents influence the sexual orientation of their children? Findings from a longitudinal study of lesbian families. *Developmental Psychology*, 32, 3-11.

Good, C.D., Johnsrude, I., Ashburner, J., Henson, R.N.A., Friston, K.J., Frackowiak, R.S.J. (2001). Cerebral asymmetry and the effects of sex and handedness on brain structure: a voxel-based morphometric analysis of 465 normal adult human brains. *Neuroimage*, 14, 685-700.

Green, R., & Young, R. (2001). Hand Preference, Sexual Preference, and Transsexualism. *Archives of Sexual Behavior*, 30(6), 565

Grov, C., Bimbi, D. S., Nanín, J. E., & Parsons, J. T.. (2006). Race, Ethnicity, Gender, and Generational Factors Associated with the Coming-out Process among Gay, Lesbian, and Bisexual Individuals. *The Journal of Sex Research*, 43(2), 115–121. Retrieved from <http://www.jstor.org/stable/20620236>

Herek, G. (n.d.). Homosexuality and Mental Health. Retrieved March 26, 2016, from [http://psc.dss.ucdavis.edu/rainbow/HTML/facts\\_mental\\_health.HTML](http://psc.dss.ucdavis.edu/rainbow/HTML/facts_mental_health.HTML)

Johnson, S., & Connor, E. (2002). Introduction. In *The gay baby boom: The psychology of gay parenthood*. New York: New York University Press.

Koffman, K., Koffman, L., & Ericson, K. (2013, October 1). The Size of the LGBT Population and the Magnitude of Anti-Gay Sentiment are Substantially Underestimated. Retrieved June 9, 2015, from <http://www.nber.org/papers/w19508>

Kruse, M. (1985). Nature/nurture: Reflections on approaches to the study of homosexuality. *Journal of homosexuality*, 10(3-4), 141-152.

LGBT Youth. (2014, November 12). Retrieved April 28, 2016, from <http://www.cdc.gov/lgbthealth/youth.htm>

McConaghy, N., Hadzi-Pavlovic, D., Stevens, C., Manicavasagar, V., Buhrich, N., & Vollmer-Conna, U. (2006). Fraternal Birth Order and Ratio of Heterosexual/Homosexual Feelings in Women and Men. *Journal of Homosexuality*, 51(4), 161-174.

Money, J. (1987). Sin, sickness, or status? Homosexual gender identity and psychoneuroendocrinology. *American Psychologist*, 42, 384-399.

Pickett, B. (2002, August 06). Homosexuality. Retrieved March 26, 2016, from <http://plato.stanford.edu/entries/homosexuality/#His>

Rahman, Q., & Hull, M. S. (2005). An Empirical Test of the Kin Selection Hypothesis for Male Homosexuality. *Archives Of Sexual Behavior*, 34(4), 461-467. doi:10.1007/s10508-005-4345-6



Robertson, G. (1972). Parent-child relationships and homosexuality. *The British Journal of Psychiatry*, 121, 525-528.

Rogol, A.D., Clark, P.A., Roemmich, J.N. (2000). Growth and pubertal development in children and adolescents: effects of diet and physical activity. *American Journal of Clinical Nutrition*, 72(2), 521-528.

Shapiro, L. (2012, February 06). Highest Number Of Anti-Gay Murders Ever Reported In 2011: The National Coalition of Anti-Violence Programs. Retrieved March 26, 2016, from [http://www.huffingtonpost.com/2012/06/02/anti-gay-hate-crimes-murders-national-coalition-of-anti-violence-programs\\_n\\_1564885.html](http://www.huffingtonpost.com/2012/06/02/anti-gay-hate-crimes-murders-national-coalition-of-anti-violence-programs_n_1564885.html)

The Kinsey Institute - Kinsey Sexuality Rating Scale. (2016). Retrieved April 29, 2016, from <http://www.kinseyinstitute.org/research/ak-hhscale.html>