Testing an Evolutionary-Psychological Model of Incest

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UNIVERSITY OF MIAMI

A dissertation submitted in partial fulfillment of
the requirements for the degree of
Doctor of Philosophy

TESTING AN EVOLUTIONARY-PSYCHOLOGICAL MODEL OF INCEST

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Predictive literature on incest has focused extensively on the dynamics of the home environment, but much less attention has been paid to the individual characteristics of offenders and the victims they target. Using the 2015 dataset from the National Incident-Based Reporting System (NIBRS), a national database of criminal offenders maintained by the National Archive of Criminal Data, this dissertation sets out to complement the existing predictive framework by identifying individual characteristics associated with incest. Findings include: males constituted 93% of all biological incest offenders; females constituted 78% of all biological incest victims, the majority of which fell within fertile ages (11-40), while a substantial percentage (46%) were under age 11; forcible cases of biological incest were 4.5 times more frequent than non-forcible cases; the proportion of biological incest cases committed by a stepparent is more than 10 times greater than the proportion of stepparents in the population; incest between a biological mother and her child is the rarest type of incest on a per capita basis, with 1 case of incest occurring for every 470,180 mother-child pairs in the United States; incest between a stepfather and stepchild was the most frequent type, with 1 case occurring for every 3,384 pairs. These findings were largely consistent with an evolutionary-psychological model of incest and kin-detection.
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CHAPTER 1: INTRODUCTION

Anthropologists call incest “the universal taboo” (Rosman, Rubel & Weisgrau, 2009). Norms and rules against incest have been, and are, a pervasive feature of both traditional and modern societies, and prohibitions against incest have been a constant feature of legal codes across cultures and over time. Today, incest (either through marriage or sexual contact) is prohibited in some capacity in every state of the United States and in most countries of the world, just as it was in the earliest extant legal codes of the ancient near east (e.g., the Code of Hammurabi, the Hittite laws, the Assyrian code), the earliest extant legal codes of the ancient far east (e.g., the T’ang Code, the Laws of Manu), the laws of Classical, Middle-Age, Renaissance, and Enlightenment Europe, and by all of the major Abrahamic religious texts (Berkowitz, 2013; Brundage, 1987; Bryce, 2004; Buhler, 1886; Johnson, 1979; Lieberman & Patrick, 2018; Patrick & Lieberman, 2018; Sassoon, 2005).

Humans are also, across cultures, extremely incest-averse. Research demonstrates both strong, first-person aversions to participating in incestuous acts (Tybur, Lieberman, & Griskevicious, 2009), as well as robust moral objections to incestuous acts by third parties (e.g., Haidt, 2001; Lieberman, Tooby, & Cosmides, 2003). And yet despite humankind’s widespread aversion to incest, and despite the ubiquity of laws and taboos prohibiting it, sexual relationships between family members nonetheless occur in non-trivial rates, with thousands of cases reported every year (Finkelhor, 1984; U.S. Dept. of Justice, 2000). The question that this dissertation aims to address is why this happens. Why, if humans are so personally disgusted and so morally opposed to incest, do we still observe the rates of incidence that we do?
This dissertation draws from two separate lines of research. The first is the body of literature from psychology, psychiatry, sociology and criminology that has attempted to explain and predict the occurrence (and reoccurrence) of incest. The second is the growing body of work in the evolutionary behavioral sciences on kin-detection and incest avoidance. For the most part, the first line of research—that concerned with predicting and explaining incest—has yet to utilize the insights gained from the second.

Scholars in the evolutionary fields have made great headway in understanding how the mind computes and generates our aversion to incest, and here, using data gathered from National Archive of Criminal Justice Data, this dissertation will use an evolutionary-psychological model of incest to generate and test predictions, several of which run counter to the predictions generated by the currently-dominant theoretical models, about the conditions under which we might expect incest to occur.

**Predictive Models of Incest**

Research relating to incest, particularly research that focuses on risk factors or predictive models of incest, has been conducted across a range of disciplines including psychology (e.g., Griffee et al., 2014), psychiatry (e.g., Adler & Shutz, 1995), and criminology/sociology (e.g., Finkelhor, 2008; Vander Mey & Neff, 1984). Sometimes this research sets out to specifically examine incest, but because incest cases are, relative to other offenses, rare, most of the relevant research is often a small part of a much larger study regarding sexual abuse, often sexual abuse towards children (e.g. Finkelhor, 1984).

These studies have valuably identified a number of risk factors for incest (note: while many of the studies identify the factors as “predictive,” it is in some cases more
Table 1. Studies identifying risk factors and phenomena correlating with incidences of incest.

<table>
<thead>
<tr>
<th>Study</th>
<th>Risk Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PARENT-CHILD INCEST STUDIES</strong></td>
<td></td>
</tr>
<tr>
<td>Finkelhor (1978)</td>
<td>personal characteristics of the offender (cites both domineering and “inhibited” offenders), alcohol use, a breakdown of sexual relations between husband and wife, fear of abandonment among family members, geographic or economic isolation, poor sexual boundaries within the family, unemployment, opportunity factors</td>
</tr>
<tr>
<td>Meiselman (1979)</td>
<td>sexual and emotional unavailability of mother</td>
</tr>
<tr>
<td>Herman &amp; Hirschman (1981)</td>
<td>paternal violence, maternal disability, “acting-out” by adolescent female victim</td>
</tr>
<tr>
<td>Parker and Parker (1986)</td>
<td>lack of early involvement in child’s life, poor relationship between offender and own parents</td>
</tr>
<tr>
<td>Russell (1986)</td>
<td>divorce and presence of man in home other than biological father</td>
</tr>
<tr>
<td>Alexander &amp; Lupfer (1987)</td>
<td>a “traditional patriarchal family structure”</td>
</tr>
<tr>
<td>Paveza (1988)</td>
<td>low mother-daughter closeness, low marital satisfaction, spousal abuse by father, low income</td>
</tr>
<tr>
<td>Sariola &amp; Uutela (1996)</td>
<td>divorce and presence of man in home other than biological father</td>
</tr>
<tr>
<td>Studer et al. (2000)</td>
<td>prior pedophilic behavior and tendencies</td>
</tr>
<tr>
<td>Stroebel et al. (2013)</td>
<td>parental fighting, acceptance of nudity, lack of maternal affection, step-parenthood</td>
</tr>
<tr>
<td>Goodman-Delahunt (2014)</td>
<td>sex of offender (male), sex of victim (female), repeated incidences, penetration, most offenders not sexually abused as children, criminal history with at least 1/3 committing non-sexual offenses</td>
</tr>
<tr>
<td><strong>SIBLING INCEST STUDIES</strong></td>
<td></td>
</tr>
<tr>
<td>Symonds et al. (1981)</td>
<td>bed sharing, bath sharing</td>
</tr>
<tr>
<td>O-Brien (1991)</td>
<td>parental physical (non-sexual) abuse</td>
</tr>
<tr>
<td>Adler &amp; Schutz (1995)</td>
<td>parental physical (non-sexual) abuse</td>
</tr>
<tr>
<td>Araji (1997)</td>
<td>being a victim of parental incest, sexualized family environment, witnessing violence within nuclear family</td>
</tr>
<tr>
<td>Caffaro and Conn-Caffaro (1998)</td>
<td>(based on interviews, no statistical analysis) parental unavailability, sexualized home environment, lack of sex education, lack of parental supervision, lack of supportive relationships, power imbalance among siblings, unclear boundaries, room sharing, victim’s dependence on older/more powerful siblings</td>
</tr>
<tr>
<td>Beard et al. (2013)</td>
<td>being a victim of parent-child incest</td>
</tr>
<tr>
<td>Griffie et al. (2014)</td>
<td>bed sharing, parent-child incest, family nudity, low levels of maternal affection, bath tub sharing</td>
</tr>
<tr>
<td><strong>COMBINED PARENTAL/SIBLING INCEST STUDIES</strong></td>
<td></td>
</tr>
<tr>
<td>Vander Mey &amp; Neff (1984)</td>
<td>alcohol dependency, spouse abuse, non-sexual child abuse or neglect, inadequate housing, social isolation, birth order (e.g., oldest female child)</td>
</tr>
<tr>
<td>German, Habenicht, &amp; Futcher (1990)</td>
<td>female victim: shyness, expedience, guilt-proneness, aggressiveness, overall low-concept (based on a number of standard personality and self-concept scales)</td>
</tr>
<tr>
<td>Hanson, Gizzarelli, &amp; Scott (1994)</td>
<td>attitudes of male sexual privilege or entitlement, perception of children as being sexually attractive and sexually motivated, attitudes minimizing the harm caused by sexual abuse of children</td>
</tr>
<tr>
<td>Firestone et al. (1999)</td>
<td>factors predicting recidivism: alcohol use, higher scores on psychopathy</td>
</tr>
</tbody>
</table>
A number of patterns emerge from this literature. One positive pattern, for example, is that several indicators show up repeatedly across studies (e.g., parental conflict, a pattern of alcohol abuse), thus lending credence to their validity. On the other hand, one negative pattern to emerge is that these various studies have often proceeded in an atheoretical fashion, without a coherent underlying predictive model. Instead, researchers have largely worked inductively, gathering as much data as possible, looking for noteworthy (or statistically significant) patterns, and then attempting to construct post-hoc explanations for the patterns observed.

Three theoretical models currently dominate the literature: the family-systems model, the cumulative interactions model, and the Finkelhor model. The family-systems model focuses on the health of the marital relationship and seeks to explain incest (both parental and sibling) as a result of a breakdown of the parents’ marriage (e.g., Friedman, 1988). In the case of parental (particularly father-daughter and stepfather-stepdaughter) incest, a family-systems approach views the father’s behavior as a result of the breakdown of the marital relationship, causing the father to seek his child as a sexual and emotional substitute (e.g., Greenspun, 1994). In the case of sibling incest, this approach views the siblings’ behavior as a result of neglectful or emotionally distant parents (particularly mothers), and often relies on marital conflict as a predictive warning sign (e.g., Hardy, 2001; Laviola, 1992). In this view, incest in all cases is the product of a breakdown of healthy familial relationships. As Tal and Lieberman (2007, p. 207) characterize the logic: “[f]athers abuse daughters because the relationship with the
mother has deteriorated and the daughter is capable of filling the void; brothers abuse sisters, or siblings engage in consensual incest for comfort when parental relations disintegrate.”

The second model, the cumulative interactions model, views incest as “the cumulative result of a circular pattern of interactions within the nuclear famil[y]” (Stoebel et al., 2013, p. 601). Like the family-systems model, the cumulative interactions model looks to explain incest via a breakdown in the traditional family culture. But where the family-systems model places a particular emphasis on the health of the marital relationship, the cumulative interactions model incorporates factors relating to a heightened sexualized environment in the home, such as the acceptance and encouragement of nudity, permission for children to see the parents’ genitals, and, in the case of sibling incest, the eroticization or sexual abuse of the children by the parents (e.g., Griffée et al., 2014; Stroebel et al., 2013).

Finally, the Finkelhor model, relative to both the family-systems model and the cumulative interactions model, takes a more holistic approach to incest prediction. Like the family-systems model, the Finkelhor model relies on information as to the dynamics of the home and the marital relationship, but it also goes further to incorporate person-specific factors related to the victims and offenders (Finkelhor, 1984). In particular, the Finkelhor model emphasizes the importance of factors relating to individual motivation to abuse a child (e.g., the need to fulfill an emotional void; experiencing sexual arousal at the recollection of a childhood sexual experience, whether traumatic, pleasant, or both), and the ability of the abuser to overcome inhibitors (e.g., via alcohol abuse, or mothers who are absent, ill, emotionally distant, or in an abusive relationship). And while the
Finkelhor model has perhaps been the best at identifying and describing predictors, it unfortunately has fallen short of providing a theoretically coherent model for why the particular person and situation specific variables matter are predictive.

Each of these predictive models of incest is subject to some important criticisms. Rarely, for example, do these theories consider that the apparent “causes” of incest could also be products of a common underlying variable. Consider the repeated observation of a sexualized home environment, or prevalence of nudity in the homes where incest has occurred (e.g., Finkelhor, 1978; Symonds et al., 1981; Araji, 1997; Caffaro and Conn-Caffaro, 1998; Stroebel et al., 2013). These observations could just as easily be spurious to incest—products of a common cause—yet rarely are they considered as such. And even if we were to grant for the sake of argument that a sexualized home environment might lead to incest, none of these models offer a coherent explanation for why the home environment might become sexualized in the first place. The same goes for the existence of parental conflict, lack of parental affection or availability, the need to fulfill an emotional void, experiencing sexual arousal at the recollection of a childhood sexual experience, and so on. As a result, we are left with an unsatisfying answer to why incest occurs and, consequently, an impoverished model for predicting incest going forward.

Another consequence of this under-theorization is that many of the studies, including those by Firestone et al. (1999), Stroebel et al. (2012), Beard et al. (2013), Stroebel et al. (2013), O’Keefe et al. (2014) and Griffée et al (2014), have confounding methodological issues, such as (1) the failure to distinguish between full, half, and step relatives, (2) the use of the same set of predictors for parental and sibling incest, and (3) employing liberal definitions of incest that fail to distinguish between more serious (e.g.,
forcible sexual intercourse) and less serious (e.g., showing and looking at genitals) events. As I will detail in the next section, these distinctions can matter a great deal. From an evolutionary point of view, sex with genetic relatives and sex with step relatives can (and I will argue, should) be treated as categorically different events, despite the fact that they are often included together in other (e.g., legal) definitions of incest. This criticism also extends to the distinction between parental and sibling incest. Research has identified distinct mechanisms for detecting offspring, parents, and siblings, and while breakdowns of these mechanisms may derive from common circumstances, there are many cases where they will not (Billingsley, Antfolk, Santtila, & Lieberman, *in press*; Lieberman & Patrick, 2018; Lieberman, Tooby, & Cosmides, 2007).

Other problems persist. None of these theories, for example, can account for some of the more perplexing empirical findings, such as the fact that parental offenders are often categorized as low risk by traditional sex offender risk instruments (Hanson & Thornton, 2000), and are, relative to extrafamilial sex offenders, (1) older, (2) more likely to be in an enduring adult intimate relationship, and (3) more likely to be stably employed (Goodman-Delahaunty, 2014; Middleton, 2013).

Moreover, because the theoretical predictions generated by the existing models of incest often focus on the dynamics of the home environment, the existing literature often is agnostic towards, or fails to account for, potentially-meaningful variables relating to the individual characteristics of the offenders and victims, such as their gender, age, or whether they are biological or step relatives.

One potential explanation for these oversights is that individual studies within disciplines frequently ignore the theory and empirical findings of outside disciplines.
Contrary to the existing theoretical models of incest, an evolutionary account makes strong predictions regarding the individual characteristics of offenders and victims (e.g., their genders and genetic relatedness), as well as the nature of the offense itself (e.g., forcible vs. nonforcible). This dissertation aims to incorporate the insights of an evolutionary account to (a) provide a coherent theoretical explanation of the existing literature by developing a meaningful taxonomy of the different “kinds” of incest, and (b) test predictions, many of which differ from those generated by existing theoretical models, as to what types of individuals will commit incest, and also the circumstances under which we might expect it to occur.

**Evolutionary Models of Incest Avoidance**

Inbreeding is perilous to the reproductive enterprise. Mating with close genetic relatives not only increases the chances of passing on deleterious recessive mutations to offspring, but also hinders the offspring’s ability to fight short-generation pathogens that are more likely to flourish in a stable host environment (Bittles & Neel, 1994; Tooby, 1982). Consequently, inbred offspring (both human and non-human animal) are more prone to physical disability and cognitive deficits than their outbred counterparts (e.g., Charlesworth & Willis, 2009; Liberg et al., 2005). For example, children born to first cousins are 4% more likely to die in infancy or early-childhood than children of unrelated parents (Bittles, Mason, Greene, & Rao, 1991). In cases where the child is sired by the mother’s father or brother, some estimates place the odds of mortality and severe birth defects at nearly six times that of unrelated parents (Bittles, 2005). Because these threats to viable offspring have been stable and recurrent over human history, we should expect, all other things being equal, for evolution to have tailored our psychology to negotiate
such threats – in other words, to avoid mating with kin (Lieberman, Tooby, & Cosmides, 2007).

Many scholars believe that disgust, in particular a subset of disgust functions known as “sexual disgust,” is the primary mechanism by which humans are discouraged from mating with kin (Angyal, 1941, Lieberman et al., 2007; Tybur, Lieberman, Kurzban, & DeScioli, 2013). In this view, the thought or opportunity of sex with close genetic relatives activates a cascade of downstream psychological and physiological outputs designed to prevent sexual activity: sexual attraction is downregulated, eye gaze is averted, people “scrunch” their faces, try to leave the situation, and experience nausea or other gag reflexes. (These outputs are also produced at the thought or opportunity of sex with other mates who pose risks to the successful reproduction of viable offspring, such as the pre-reproductive (the very young) and the post-reproductive (the very old) (Lieberman & Patrick, 2018).)

But in order for such an avoidance program to function, humans would first need some way of detecting kin. What is more, they would need to be able to reliably identify kin in an environment without genetic technology, paternity tests, mirrors, or a universal language that could consistently identify precise genetic relationships (Ackerman, Kenrick, & Schaller, 2007; Park, Schaller, & Van Vugt, 2008; Sznycer et al., 2016). Because humans in the ancestral environment were unable to explicitly identify shared genes, evolution should have therefore engineered systems that instead utilize informational cues that reliably correlated with genetic relatedness (e.g., Winterntiz & Abbate, 2015). Importantly, these cues should also vary by relationship: the cues that indicated another person was one’s parent would not be the same cues that indicated
another person was one’s child. As a result, researchers have often used these different relationships to carve our kin-detection psychology at its joints (DeBruine, 2002, 2005; Fessler & Navarrete, 2004; Lieberman, Tooby, & Cosmides, 2007; Park, Schaller, & Van Vugt, 2008). This taxonomy is outlined below.

*Identifying siblings.* Researchers have identified several ecological cues that humans use to identify probable siblings, but the most—and the strongest—evidence is in favor of two: coresidence duration and maternal perinatal association. Coresidence duration is, as the name suggests, generally defined as close physical association during childhood (e.g., Fessler & Navarrete, 2004; Westermarck, 1891). It is meant to capture the phenomenon of children being raised in the same home/family. The evolutionary logic behind this cue is that being raised in the same home or family would have been a good predictor of genetic siblingship in ancestral environments (Lieberman et al., 2007). Ethnographic observations of modern foragers substantiate this logic (Sznycer et al., 2016), and a range studies illustrate that coresidence duration predicts (a) increased sexual aversion among siblings (Lieberman et al., 2007; Sznycer et al., 2016; (b) sexual disgust at the thought of performing sexual acts with a sibling (De Smet, Van Speybroeck, & Verplaetse, 2014); and (c) moral opposition to incest (Fessler & Navarrete, 2004). Coresidence duration also predicts lower marriage rates, higher divorce rates, and lower fertility among non-related individuals who were nonetheless reared together (e.g., McCabe, 1983; Shepher, 1971; Westermarck, 1891; Wolf, 1995).

The second cue, Maternal perinatal association (MPA), has been operationalized as the observation of a female breast-feeding a newborn, which derives from the logic that under ancestral conditions any infant regularly nurtured by one’s mother is likely to
be a genetic sibling (Lieberman et al., 2007). Because MPA should have been a stronger indicator of relatedness than coresidence duration (in other words, it was more likely for children to coreside, even when not related, than it was for one’s mother to breastfeed an unrelated newborn) MPA has been hypothesized, and found, to mediate coresidence duration (Lieberman, 2003; Lieberman et al., 2007; Syzncer et al., 2016). That is, coresidence duration predicts sexual aversions between opposite sex siblings, but only when the MPA cue is absent (i.e., in the case of a younger sibling, who would not have the opportunity to witness their mother breastfeeding an older sibling). When MPA is present (as it would be in the case of an older sibling), it alone predicts sexual aversions. These findings been replicated across cultures, including studies in Santa Barbara, Hawaii, Dominica, Belgium, and Argentina, and they generalize from industrial populations to societies similar to the foraging lifestyles of our ancestors (Lieberman, 2003; Lieberman, Tooby, & Cosmides, 2007; Sznycer et al., 2016).

*Identifying children.* The most certain relationship among kin is that of mother and child. In the environment of our ancestors (i.e. prior to surrogacy), a woman could always be sure with absolute certainty that a child she birthed was hers. As a result, birth is, and remains, the strongest cue that mothers utilize in identifying offspring. However, research has also identified a number of secondary cues that enable continued identification, including cry recognition (Formby, 1967; Murray, Hollien, & Muller, 1975), and olfactory cues (Porter & Moore, 1981; Russell, Mendelson, and Peeke, 1983; Weisfeld, Czilli, & Phillips, 2003).

Fathers, on the other hand, face a much more complex task in identifying offspring.Unlike mothers, who can rely on birth, fathers have no failsafe mechanism for
identifying offspring with perfect reliability. From an information-processing perspective, fathers are beset not just by the remoteness of birth from intercourse, but also by the difficulty of spotting infidelity and the possibility of cuckoldry. In traditional hunter-gatherer societies, anywhere from 2% to 9% of men raise children who are not their own (Baker & Bellis, 1995; Neel & Weiss, 1975), and other studies have found, across cultures, non-paternity rates ranging from a median of 1.7% (for men with high confidence in the fidelity of the partners) to 29.8% (for men with low confidence in the fidelity of their partners) (Anderson, 2006).

As a consequence, ancestral men could not simply rely on the same cues upon which siblings (MPA and coresidence) or mothers (birth, breast-feeding, cry recognition, olfactory cues) rely, as those cues would not be robust to infidelity. In fact, a few studies have affirmatively shown that several of these cues, such as MPA (Billingsly et al., in press), coresidence duration (Williams & Finkelhor, 1995), and olfactation (Russell et al., 1983; Weisfeld, Czilli, & Phillips, 2003) fail to replicate among father-offspring dyads. Ostensibly, such cues are unreliable because they would be present regardless of whether the purported father was in fact the actual father.

Relying on such logic, researchers have hypothesized several informational cues that would have correlated with actual biological paternity under ancestral conditions, including frequency of intercourse (Tal & Lieberman, 2007), intercourse—or the lack thereof—timed with fertilization (Lieberman & Patrick, 2018), previous mate promiscuity or infidelity (Apicella & Marlowe, 2004), relative mate values of the prospective father and his mate (Symons, 1979), and phenotypic similarity or facial resemblance (Daly & Wilson, 1982). Subsequent research has borne out several of these
predictions, particularly with respect to sexual fidelity. Specifically, numerous findings show a relationship between perceived spousal fidelity and the amount of parental investment by the putative father (Apicella & Marlowe, 2004; Daly & Wilson, 1980, 1988; Fox & Bruce, 2001; Gaulin & Schlegel, 1980; Hartung, 1981; Platek et al., 2003). Several studies have also substantiated the connection between perceived degrees of offspring resemblance and parental investment (Alvergne, Faurie, & Raymond, 2007; Apicella & Marlowe, 2004; Daly & Wilson, 1982; Heijkoop, Semon Dubas, & Van Aken, 2009; Prokop, Obertova, & Fedor, 2010), though recent research has questioned the strength of these particular findings (Billingsly et al., in press).

**Identifying parents.** Very little empirical work has been done to pinpoint how children identify their parents. Following the general evolutionary logic underlying the findings of the sibling-detection and offspring-detection research, scholars have proposed several cues that children might use to identify their mother (breast-feeding, and auditory and olfactory cues), and their father (maternal association and paternal investment – piggybacking on the kin-detection mechanisms of the parents) (see Lieberman & Patrick, 2018). However, empirical work in this area has only been able to verify a few of these predictions, with the strongest data supporting claims that infants can recognize the smell (e.g., Vaglio, 2009), milk (e.g., Mizuno, Mizuno, Shinohara, & Noda, 2004; Nishitani et al., 2009), voice (e.g., Kisilevsky et al., 2003; Mehler, Bertoncini, & Barriere, 1978) and face (Bushnell, 2001; Field, Cohen, Garcia, & Greenberg, 1984) of their mother only. Interestingly, the continued recognition of the mother present in these studies appears to be predicated on skin-to-skin contact or breastfeeding by the mother of the newborn, leaving open the question of whether a child attaches the tag of “mother” to whomever
breastfeeds (or holds) the child immediately following birth (but see Kisilevsky et al., 2003).

Research has given us much insight into both why we tend to avoid incest (e.g., to decrease the risk of passing on deleterious recessive alleles to offspring) as well as how our minds do so – how humans utilize ecological cues that reliably correlated with relatedness to regulate sexual attraction. One potential cause of incest suggested by these findings is a break-down in these cues. If humans do not detect the requisite information required to tag another individual as “kin,” then the sexual-avoidance systems that utilize this information may not generate (or may not generate in as intense a fashion) the sexual aversion that usually accompanies that identification.

Kin-detection, however, is not a unitary phenomenon. The cues that humans rely on to assess genetic relatedness (and thus, influence sexual disgust and aversion) vary as a function of the relationship in question. These distinctions are important because if we want to understand why incest sometimes happens, we need to first understand why it usually does not. That is, we need to first understand how the system works before we can identify the error that is causing it to malfunction. The process for doing so will vary based on whether we are talking about a mother and child, father and child, or sibling pair.

**Other Factors Contributing to Incestuous Behavior**

If kin have been identified with probable certainty, that identification is usually a strong enough indicator to initiate sexual disgust/aversion and to discourage sexual activity (De Smet, Van Speybroeck, & Verplaetse, 2014; Fessler & Navarrete, 2004; Lieberman et al., 2007; Sznycer et al., 2016). If there is a breakdown or deficit in the
informational chain required to identify kin, however, there is then reason to assume that sexual disgust and sexual aversion may not operate as intended and may weaken the barrier to intra-familial sexual relationships.

Other factors may also exacerbate or compound this effect. One such factor is simply the gender of the individual at issue. The risks associated with potential inbreeding are different for men and women. Reproduction, in general, is riskier for women, who invest more both at the outset (at minimum 9 months of pregnancy) and during the early life (usually years of breastfeeding and additional care) of the child (Haig, 1999; Walter & Byske, 2003). Incest, or potential incest where relatedness cues are ambiguous, only amplifies this asymmetry, where men may (particularly under ancestral conditions) more easily leave or otherwise wash their hands of the situation (Gangestad, 2003).

Another possible factor could be damage or impairment to the underlying physical structure or operation of the brain. It is well documented that alcohol and drug use affect decision-making generally (e.g., George, Rogers, & Duka, 2005), specifically in relation to criminal behavior (e.g., Graham & West, 2001), and even more specifically to sexual abuse (e.g., Abracen, Looman, & Anderson, 2000). Though there is no consensus as to precisely how alcohol affects decision making, one prominent theory is that alcohol impairs the accurate weighting of costs and benefits that often takes subconsciously when humans make choices (Bechara et al., 2001; George et al., 2005 Goudriaan, 2005; Mackillop et al., 2014). In particular, alcohol has been perceived to overweight potential benefits and underweight potential costs. If this is indeed the case, we might anticipate similar effects with respect to sex and sexual abuse in the context of
related individuals, with greater weights ascribed to potential benefits (e.g., new
offspring) and lower weights ascribed to potential costs (e.g., genetic defects to the
offspring).

Similarly, brain injuries or developmental disabilities to neural regions associated
with either (a) the acquisition of relevant kin-detection cues, (b) the processing of such
cues and translation of that information into kinship estimates, or (c) disgust or other
systems of sexual aversion, could all also hinder one’s ability to appropriately detect and
avoid incest (Calder et al., 2000; Phillips et al., 1997).

**Integrating Theory**

The evolutionary psychological model presented here suggests incest may often
result from missing or ambiguous cues to genetic relatedness, and moreover that such
deprivation may (a) have a disproportionate effect on males, and (b) be exacerbated in the
face of substance abuse or other cognitive impairments. From this general hypothesis, we
can begin to generate more specific predictions about the demographics of incest
offenders, victims, and contexts, which should vary as a function of the kinship dynamic
in question. For example, for siblings, prior research has identified maternal perinatal
association and childhood coresidence as key cues that the brain uses to generate kinship
estimates (Lieberman, Tooby, & Cosmides, 2007). Therefore, in the case of siblings, we
should expect that children reared apart from one another and later reunited tend to be
more prone to incest than those raised in the same household, where they are registering
coresidence duration and observing the maternal care of younger siblings. Similarly,
cases of mother-child incest should be exceedingly rare, because mothers, by virtue of
having birthed a baby, can be certain that a child is hers. We should thus expect, all other
things being equal, to also see mother-child incest stemming from unregistered kinship only in extreme cases such as early separation and re-introduction.

By contrast, fathers appear to rely on a separate set of cues, in particular the timing and frequency of intercourse with a mate, as well as her fidelity to the relationship (Billingsly et al., in press; Hrdy, 1974; Lieberman & Patrick, 2018; Quinlan & Quinlan, 2008). Accordingly, in cases of father-child incest, we might expect to observe past infidelity on the part of the spouse (or, more specifically, perceived infidelity), or even cues suggesting infidelity (e.g., a promiscuous past, overt flirtations with other men, a lack of intercourse during the time of fertilization), and perhaps even cues that merely allow for the possibility of infidelity (frequent absence from spouse during the time of fertilization).

Prior research corroborates some of these predictions, albeit often in an indirect way. Much of the prior literature, for example, identifies a neglectful mother as a risk factor for sibling incest (e.g., Caffaro & Conn-Caffaro, 1998; Griffie et al., 2014). Though the typical explanation for this phenomenon is that that the siblings turn to one another for the affection they are not receiving from their mother, an alternate explanation could be that they have not witnessed the maternal perinatal association that helps to generate the identification of their sibling (Lieberman, Tooby, & Cosmides, 2007). Other studies are more direct, establishing a link between childhood separation (read: a lack of coresidence and witnessing of MPA) and sibling incest (Bevc, & Silverman, 1993, 2000; Weinberg, 1955).

Similarly, a number of studies have identified marital discord and domestic abuse as potential risk factors for parent-child incest (e.g., Finkelhor, 1978; Herman &
Hirschman, 1981; Stroebel et al., 2013). Again, the traditional explanation in these studies frequently revolves around the parent turning to the child as a sexual and emotional substitute for the mother (e.g., Greenspun, 1994). But it could also be the case that the conflict driving marital discord and domestic abuse is perceived infidelity, and if the perceived infidelity is indeed a critical cue for paternity assessments, then it could be the lack of a reliable paternity assessment that was the underlying cause of the behavior. (The model outlined above would also predict it to be especially acute if the perceived infidelity coincided with the time of conception.)

Reconciling Definitions

One of the difficulties of creating a predictive framework for incest is that there is no universal definition for what incest comprises. Most would agree that incest refers to sexual acts between relatives. But what constitutes “sexual act” and what constitutes “relative” can differ from jurisdiction to jurisdiction, between disciplines, between scholars, and between individual studies conducted by the same scholars. For example, the requisite sexual acts constituting “incest” under state law vary by state, and can be limited to intercourse only (e.g., Official Code of Georgia Annotated § 16-6-22), vaginal penetration (e.g., Alaska Statute § 11.41.450), oral or anal sex (e.g., New York Penal Code §§ 255.25-255.27), or even just sexual contact (Colorado Revised Statutes § 18-6-303). As mentioned above, studies are often even more liberal with their definitions, sometimes including genital display or looking at the genitals of another family member (e.g., Stroebel et al., 2012; Stroebel et al., 2013; Griffée et al., 2014).

What constitutes a “relative” is similarly murky. It can include those related by lineal consanguinity (i.e. direct descendants such as parents, children, grandparents,
grandchildren), “immediate” family such as brothers and sisters, and second-degree relatives such as aunts, uncles, nieces and nephews (e.g., Florida Statute § 826.04). It can include “legitimate” or “illegitimate” relatives, as well as those of “whole or half-blood” and even adopted relatives (e.g. Code of Alabama § 13A-13-3). Washington D.C.’s statute (D.C. Code §§ 22-1901, 46-401), even includes the relatives of one’s spouse (e.g., a husband’s father) and children (e.g., a son’s wife). Perhaps most importantly, incest statutes often (roughly 50%) include step-relatives within the list of prohibited relationships. Prior research on incest follows suit: though must studies tend to focus on a particular dynamic (e.g., parent-child or sibling-sibling), they differ in their handling of borderline cases (e.g., step, half, or relatives by marriage) – sometimes including them, other times not, and often without any theoretical rationale for the choice.

The ages of the parties at issue—while often measured and documented but rarely classified or analyzed—are also important. While an incestuous relationship between two adults involves one set of characteristics, when the relationship involves an adult and a younger, and particularly pre-pubescent child, an additional set of psychological taxa relating to pedophilia become salient (Briere & Runtz, 1989; Finkelhor & Araji, 1986).

Moreover, prior research often tends to conflate, or at least not distinguish, nonforcible or consensual cases of incest from cases of rape. From an evolutionary-psychological perspective, these are considerably different cases. Situations involving coercion usually require identifying only one explanation for incestuous urges (e.g., one case of missing kin-detection inputs, one case of impairment/damage), because only the offender is exhibiting the behavior of interest. The victim is presumably only engaging in the act because they are being forced to do so. Cases of consensual incest, however,
require explanations for both participants. So, for example, explaining the rape of a father against his daughter would require accounting for the father’s incestuous urges only, while nonforcible father-daughter relations require accounting for the malfunctioning of a second system.

In some instances, both sets of inputs may be altered by the same mediating event. For example, siblings separated at birth and then reunited later in life would both lack the requisite MPA (for the older sibling) and coresidence (for the younger sibling) cues required for kin-identification and sexual aversion. But often the cases will be asymmetric. In the case of father-daughter incest, the father may fail to identify his daughter as kin based on the mother’s promiscuity or her absence during the window of conception. These same inputs, however, may not necessarily have the same effect on the daughter, who might instead rely on the father’s attention and investment to estimate relatedness. In the case of wet-nursed or bottle-fed newborns, the children may have weaker assessments of maternity for their actual mother, while mothers (having birthed the children) have an extremely confident assessment of parentage.

Step-parentage, which is sometimes distinguished in both research and in legal statutes, but often is not, presents a litany of complicating considerations. Extending the example above, a step-father who is introduced to the family after the birth or the conception of the child can be certain that his step-daughter is not his own child (and thus fail to automatically remove her from the pool of potential sexual partners on the bases of her relatedness), while the step-daughter, if she is young enough, may conversely register cues (e.g., parental care and investment) sufficient to register the step-father as “father.”
From a theoretical perspective, step-parentage, particularly when the step-parent involved is a male, should be considered a substantial risk-factor for incest (to the extent that incest is defined to include step-relatives). Not only will the step-parent lack the requisite cues needed to register the child as kin, but they will also have a high degree of access and opportunity to the child. None of this is to suggest that step-parents are at a “high risk” of committing incest, but, reasoning on similar grounds, multiple studies have already confirmed that the presence of a man in the home other than the child’s biological father remains the single strongest predictor for both physical child abuse and infanticide (Daly & Wilson, 1988; Daly & Wilson, 2005). To the extent that incest is defined to include step-relatives then we should expect to see a relatively high number of cases of incest via stepparent, relative to biological. This, despite the fact that, even in studies where incest has been defined to include step-relatives, few have identified step-parentage as a risk factor (but see Sariola & Uutela, 1996; Goodman-Delahunty, 2014).
CHAPTER 2: THE CURRENT STUDY

Using 2015 data from National Incident-Based Reporting System (NIBRS), a national database of criminal offenders maintained by the National Archive of Criminal Data, this dissertation sets out to inform the existing predictive framework by testing predictions generated by the evolutionary-psychological model of incest (the “EPI” model) outlined above. The following specific questions are addressed:

1.0 Descriptive Data

A series of exploratory descriptive analyses are conducted probe predictions generated by the EPI model. The theoretical and methodological limitations of these exploratory descriptive findings are outlined in the discussion.

Sex of offenders. Because (a) the risks associated with potential inbreeding are different for men and women, and (b) the cues signaling paternity (timing and frequency of intercourse, fidelity of spouse) are more fragile than those signaling maternity (e.g., birthing the child), then, consistent with previous research on sexual assault generally (Thornhill & Palmer, 2000) and incest specifically (Goodman-Delahunty, 2014), the proportion of men in this sample committing incest should exceed the proportion of women.

Sex of victims. Extending the logic of the previous prediction, to the extent that most incest offenders are male, and to the extent that incest is the product of a human mating system (albeit one that is impaired or impoverished), an EPI model predicts that we should expect to find that most victims reflect the reproductive aims of offenders.
**Forcible vs Nonforcible.** To the extent that incestuous inclinations rely on something going wrong with the kin-detection and sexual aversion system (e.g., missing kinship cues or impairment due to substance abuse), then cases of both individuals having a breakdown in sexual aversion should be rarer than single cases. Thus, the proportion of cases constituting forcible incest (i.e. one set of missing inputs), should exceed the proportion of cases of nonforcible incest (i.e. two sets of missing inputs).

**Hypothesis Testing**

In addition to the above descriptive analyses, the following hypotheses generated by the EPI model were also tested:

*Hypothesis 1. Rates of “step incest” should exceed rates of biological incest.*

Because stepparents will lack the requisite cues needed to register the child as kin more frequently than biological parents, there should be a corresponding lack of sexual aversion and, thus, a greater number of cases of step incest relative to biological incest.

*Hypothesis 2. Rates of biological mother-to-child incest should be significantly lower than other permutations.* Because the cues indicating maternity (particularly, birth) are so reliable, and because females generally face greater risks associated with potential inbreeding than males, then cases of mother-child incest should be extremely rare, and by hypothesis lower in proportion than cases involving less reliable cues to kinship (i.e., paternity and siblingship).

*Hypothesis 3. The age distribution of incest victims should track fertility.* Consistent with the predictions regarding male offenders and female victims, to the extent that skewed sex distributions of female victims reflect the reproductive aims of offenders, then the age of female victims should track their reproductive viability. Prior
research, and indeed every available set of data on female rape victimization, has shown that rapists primarily target females of fertile ages (see Thornhill & Palmer, 2000 for a review). Thus, reasoning on the grounds that incest, like rape, is a reproductively-aimed enterprise (in an ultimate, evolutionary sense), an EPI model predicts that the ages of incest victims should (a) fall primarily within fertile ages (11-40), (b) concentrate during peak fertility (the late-teens and early twenties), and, (c) align with the age distribution of non-familial rape victims.

**Predictions Generated by Existing Models**

If incest is caused by a lack of familial (either spousal or parental) affection, or if it is caused by a cumulative sexual permissiveness in the home, then there is no a priori reason to suspect that such causes should disproportionately affect individuals along many of the lines hypothesized by the EPI model.

For example, if, according to the family systems model, “incest with a younger sibling by an older sibling is motivated largely by urges to satisfy underlying emotional needs for nurture and comfort rather than a need for sexual gratification” (Haskins, 2003, p. 341), or that parents in “an emotionally barren family…turn to their children to get their own needs met” (p. 344), then the age, sex, or relationship (biological or step) between offender and victim should not necessarily matter. Likewise, if “nudity within the nuclear family may increase the possibility that children will be more open about their interest in sex and more willing to engage in sexual activities [with other family members]” (Stroebel et al., 2013, p. 584) as is hypothesized by the cumulative interactions model, then we should not, based on that logic alone, expect to see phenomena such as sex differences either. In the same way, if incestuous behavior results
from a lack of “conditioned inhibition of sexual behavior … and critical period learning of sexual behavior” (Griffee, et al., 2014, p. 2) then there is no a priori reason to suspect that the effects of deprivation should differ between brothers and sisters, brothers and stepbrothers, and so on.

In accordance with these assumptions, the existing research literature stemming from the dominant theoretical models of incest is often ambivalent towards many of the potentially meaningful variables highlighted by the EPI model, and in some cases disregards them altogether. For example, while sex differences may sometimes appear in the raw descriptive data reported in individual studies, frequently they do not (e.g. Studer et al., 2000). Study samples are instead made up of, for example, offenders in a court-mandated rehabilitation program, or victims who have agreed to complete a survey as part of psychiatric or psychological treatment, which tend to be made up entirely of males or entirely of females, respectively. Large studies, such as this one, that are drawn from an entire population over a specified period of time are rare (but see Goodman-Delahunty, 2014).

Further, even when sex differences are present, the major theoretical models generally neither address, predict, nor explain them, and most studies stemming from those models follow suit (e.g., Alexander & Lupfer, 1987; Firestone et al., 1999; German, Habenicht, & Fucher, 1990; Griffée et al., 2014; Hanson, Gizzarelli, & Scott, 1994; Haskins, 2003; Herman & Hirschman, 1981; Quinsey et al., 1995; Rudd & Herzberger, 1999; Stroebel et al., 2012; Stroebel et al., 2013; Studer et al., 2007; Vander Mey & Neff, 1984). This trend commonly generalizes to forcible and nonforcible distinctions, step and biological distinctions, and distinctions along type of incest (mother-child/father-child-
sibling-sibling) as well. Thus, confirming the predictions generated here would not only lend support to the validity of the EPI model, but would also generate a set of etiological factors that are distinct from, and complimentary to, those generated by the dominant theoretical models of incest.

**Dataset and Procedure**

The dataset used in this dissertation is taken from the 2015 National Incident-Based Reporting System (NIBRS) database which is maintained by the National Archive of Criminal Data. The NIBRS is part of the Uniform Crime Reporting Program (UCR), a nationwide collection of criminal data, which is administered by the Federal Bureau of Investigation (FBI). The NIBRS collects data from city, county, State, and Federal automated records management systems on a per-incident basis within 22 offense categories made up of 46 specific crimes. Incident is defined as one or more offenses committed by the same offender, or group of offenders acting in concert, at the same time and place. The information is compiled into yearly reports. The yearly report for 2015—the series used for this dissertation—is the latest year compiled and made public.

The NIBRS is divided into 11 data files for public use. The 11 available files are organized according to the different categories of information they contain (e.g., information relating to the offense, to the offender, etc.) and are referred to as “segments.” The most relevant information is derived from three of those segments (offender, victim, offense), each of which contains more than 5 million entries (or individual incidents) with up to 54 variables per entry, per segment.

In categorizing their offenses, the NIBRS defines incest as nonforcible sexual intercourse between persons who are related to each other within the degrees wherein
marriage is prohibited by law. However, because the classification of incest depends on the particular statutory definition of incest being used by the agency reporting, certain non-biological sexual relationships (e.g., step parentage) are also included within the NIBRS incest category. Moreover, sexual relationships between kin are also included within several other categories, including “forcible rape,” “forcible sodomy,” and “statutory rape.” Forcible rape is defined as the carnal knowledge of a person, forcibly and/or against that person's will; or not forcibly or against the person's will where the victim is incapable of giving consent because of his/her temporary or permanent mental or physical incapacity (or because of his/her youth). Forcible sodomy is defined as oral or anal sexual intercourse with another person, forcibly and/or against that person’s will; or not forcibly or against the person’s will where the victim is incapable of giving consent because of his/her youth or because of his/her temporary permanent mental or physical incapacity. Statutory rape is defined as nonforcible sexual intercourse with a person who is under the statutory age of consent. In order to test the hypotheses of interest here, these categories were aggregated and resorted as explained below.

**Treatment of Data**

Because the definitions of incest and forcible rape employed by the NIBRS do not distinguish cases along the demarcations of interest to this study (e.g., biological vs. step; sibling incest vs. parent-child), the NIBRS data had to be sorted and recategorized based on the characteristics of, and relationship between, victims and offenders. To do this, the victim segment (N = 5,677,586), which contains detailed information on the relationship between victim and offender (if reported by the informing agency), was sorted to identify all cases falling into one of three categories: (1) incest between biological relatives (n =
(2) incest between step-relatives (n = 1,678), and (3) general incidences of rape (n = 40,898). The resulting cases were then, where possible, linked and merged with their corresponding entries in the offense segment (N = 5,669,429), and corresponding offenders from the offender segment (N = 5,765,370) using a combination of the Originating Agency Definer, the Incident Number, and a combination of the Victim Sequence Number and Offender Sequence Number.

Unless otherwise noted in the specific analyses below, “incest between biological relatives” (N = 3,798) includes those cases of incest (n = 510), forcible rape (n = 1,969), forcible sodomy (n = 1,117), and statutory rape (n = 184) from the NIBRS where the victim was either a parent (n = 30), sibling (n = 1,575), or child (n = 2,175) of the offender. Conversely, “incest between step-relatives” (N = 1,678) includes those cases of incest (n = 74), forcible rape (n = 990), forcible sodomy (n = 365), and statutory rape (n = 249) from the NIBRS where the victim was either the stepparent (n = 206), stepsibling (n = 466), or stepchild (n = 1,006) of the offender. “General incidences of rape” (n = 40,898) includes cases of incest (n = 93), forcible rape (n = 32,460), forcible sodomy (n = 4,410), and statutory rape (n = 3,935) from the NIBRS where the victim was none of the above listed categories (genetic or step: parent, child, or sibling). Because incest among non-immediate family members (e.g., aunts and uncles, grandparents) likely involves the breakdown of additional kin-detection mechanisms that are beyond the scope of this dissertation, non-immediate or undefined family members (n = 1,658) were excluded from analyses, as were cases where the relationship between the victim and offender was unknown (n = 3,332). These cases are summarized in Table 2.
<table>
<thead>
<tr>
<th>Re-sorted Categories</th>
<th>No. of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Included Cases</strong></td>
<td><strong>46,474</strong></td>
</tr>
<tr>
<td>Incest Between Biological Relatives</td>
<td>3,798</td>
</tr>
<tr>
<td>NIBRS Incest</td>
<td>510</td>
</tr>
<tr>
<td>NIBRS Forcible Rape</td>
<td>1,969</td>
</tr>
<tr>
<td>NIBRS Forcible Sodomy</td>
<td>1,117</td>
</tr>
<tr>
<td>NIBRS Statutory Rape</td>
<td>184</td>
</tr>
<tr>
<td>Incest Between Step Relatives</td>
<td>1,678</td>
</tr>
<tr>
<td>NIBRS Incest</td>
<td>74</td>
</tr>
<tr>
<td>NIBRS Forcible Rape</td>
<td>990</td>
</tr>
<tr>
<td>NIBRS Forcible Sodomy</td>
<td>365</td>
</tr>
<tr>
<td>NIBRS Statutory Rape</td>
<td>249</td>
</tr>
<tr>
<td>General Incidences of Rape</td>
<td>40,898</td>
</tr>
<tr>
<td>NIBRS Incest</td>
<td>93</td>
</tr>
<tr>
<td>NIBRS Forcible Rape</td>
<td>32,460</td>
</tr>
<tr>
<td>NIBRS Forcible Sodomy</td>
<td>4,410</td>
</tr>
<tr>
<td>NIBRS Statutory Rape</td>
<td>3,935</td>
</tr>
<tr>
<td><strong>Excluded Cases</strong></td>
<td><strong>4,990</strong></td>
</tr>
<tr>
<td>Incest Among Undefined Family</td>
<td>1,658</td>
</tr>
<tr>
<td>Relationship Unknown</td>
<td>3,332</td>
</tr>
</tbody>
</table>

Where an analysis related to a characteristic of victims or offenders, then the relevant demographic was used in the analysis. Where the analysis related to the characteristics of the relationships between offenders and victims, then, in cases involving multiple victims or multiple offenders, only those victims and offenders who could be linked directly to one another were included. Based on the large sample sizes, and on the assumption that missing data resulted from reporting errors by law enforcement agencies and was thus missing at random for purposes of the analyses here (e.g., not relating to the reporting efficacy of the home agencies), cases were excluded when missing the relevant variable or variables of interest. Because the numbers of
offenses, offenders, and victims vary between segments (e.g., one offender may be responsible for multiple offenses and have multiple victims), and because missing information from either segment may have prevented linking victims and offenders, individual sample sizes or other relevant descriptive statistics are reported where appropriate for each of the separate analyses below.

**Analysis and Results**

1.0 Descriptive Data

**Sex of offenders.** The proportions of male offenders are detailed in Table 3. As expected, the difference between males and females was significant for all three cases: (1) incest between biological relatives, $X^2(1, N = 3,162) = 2360.47, p < .001$, (2) incest between step-relatives, $X^2(1, N = 1,449) = 1252.18, p < .001$, and (3) general incidences of rape $X^2(1, N = 35,046) = 30855.38, p < 0.01$. Follow up analyses also showed a significant difference in the proportion of male offenders for biological incest (93.2%) as compared to step incest (96.5%$), X^2(1, N = 4,611) = 19.663, p < .001, OR = 2.000, 95% CI [1.46, 2.73] and as compared to general incidences of rape (96.9%), $X^2(1, N = 38,208) = 122.150, p < .001, OR = 2.92, 95% CI [1.97, 2.67]$. The proportion of male offenders was not significantly different between cases of step incest and general rape $X^2(1, N = 36,495) = .877, p = .349, OR = 1.146, 95% CI [0.86, 1.53].

<table>
<thead>
<tr>
<th>Table 3. Sex of Offender.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male Offenders</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>Bio Incest</td>
</tr>
<tr>
<td>Step Incest</td>
</tr>
<tr>
<td>General Rape</td>
</tr>
</tbody>
</table>

**Sex of victims.** Sex of victim was likewise compared across the three types of offenses using a chi-square test for equality of proportions. As detailed in Table 4, the
proportion of female victims was significantly greater than males in all three cases: (1) incest between biological relatives, $X^2(1, N = 3,776) = 1215.09$, $p < .001$, (2) incest between step-relatives, $X^2(1, N = 1,677) = 966.33$, $p < .001$, and (3) general incidences of rape $X^2(1, N = 40,892) = 29442.22$, $p < .001$. Follow up analyses also showed a significant difference in the proportion of female victims for biological incest (78.4%) as compared to step incest (88.0%), $X^2(1, N = 4,434) = 70.305$, $p < .001$, OR = .496, 95% CI [0.42, 0.59], and as compared to general incidences of rape (92.4%), $X^2(1, N = 44,668) = 855.135$, $p < .001$, OR = .297, 95% CI [0.27, .32]. The proportion of female victims was also significantly different between cases of step incest and general rape $X^2(1, N = 39,270) = 45.048$, $p < .001$, OR = .598, 95% CI [.51, .70].

<table>
<thead>
<tr>
<th>Table 4. Sex of Victims.</th>
<th>Male Victims</th>
<th>Female Victims</th>
<th>Proportion Females</th>
<th>Ratio of Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio Incest</td>
<td>817</td>
<td>2,959</td>
<td>78.4%</td>
<td>3.62</td>
</tr>
<tr>
<td>Step Incest</td>
<td>202</td>
<td>1,475</td>
<td>88.0%</td>
<td>7.30</td>
</tr>
<tr>
<td>General Rape</td>
<td>3,097</td>
<td>37,795</td>
<td>92.4%</td>
<td>12.20</td>
</tr>
</tbody>
</table>

Sex of victim by sex of offender. Among cases of incest between biological relatives where the offender and victim could be linked ($N = 3,160$), male offenders were significantly more likely than their female counterparts to choose female victims (81.7% vs. 48.8%) and significantly less likely to choose male victims (18.3% vs. 51.2%) $X^2(1, N = 3,160) = 132.135$, $p < .001$, OR = .214, 95% CI [0.16, 0.28]. The cell counts are shown in Table 5a. The combination of male offender and female victim was over three times greater than all other combinations combined. Tables 5b and 5c display similar ratios for both step incest and general rape cases.
Table 5

<table>
<thead>
<tr>
<th>a. Sex of Victim by Sex of Offender (Incest)</th>
<th>Male Victims</th>
<th>Female Victims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male Offenders</td>
<td>539 (18%)</td>
<td>2,406 (82%)</td>
</tr>
<tr>
<td>Female Offenders</td>
<td>110 (51%)</td>
<td>105 (49%)</td>
</tr>
</tbody>
</table>

Note: $X^2(1, N = 3,160) = 132.135, p < 001, OR = .214, 95\% CI [0.16, 0.28]$. Numbers in parentheses indicate row percentages.

b. Sex of Victim by Sex of Offender (Step)

<table>
<thead>
<tr>
<th>Male Victims</th>
<th>Female Victims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male Offenders</td>
<td>125 (9%)</td>
</tr>
<tr>
<td>Female Offenders</td>
<td>35 (69%)</td>
</tr>
</tbody>
</table>

Note: $X^2(1, N = 1,448) = 178.301, p < 001, OR = .045, 95\% CI [0.2, 0.08]$. Numbers in parentheses indicate row percentages.

c. Sex of Victim by Sex of Offender (Rape)

<table>
<thead>
<tr>
<th>Male Victims</th>
<th>Female Victims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male Offenders</td>
<td>1,774 (5%)</td>
</tr>
<tr>
<td>Female Offenders</td>
<td>703 (65%)</td>
</tr>
</tbody>
</table>

Note: $X^2(1, N = 35,041) = 5704.705, p < 001, OR = .030, 95\% CI [0.026, 0.034]$. Numbers in parentheses indicate row percentages.

Forcible vs nonforcible. Table 6 displays the number of forcible vs nonforcible cases among the three areas of descriptive interest. Chi-square analysis revealed that cases of forcible incest (rape and sodomy) among biological relatives were significantly greater than cases of nonforcible incest (incest and statutory rape) among biological relatives $X^2(1, N = 3,776) = 1517.806, p < 001$. Forcible cases also outnumbered nonforcible cases with respect to incest among step relatives $X^2(1, N = 1,678) = 634.698, p < 001$ and general incidences of rape $X^2(1, N = 40,898) = 26372.854, p < 001$. Follow up analyses showed that there was no significant difference between the proportion of forcible to nonforcible cases between biological and step incest $X^2(1, N = 3,776) = .708, p = .400, OR = .939, 95\% CI [0.81, 1.09]$, but there were significant differences in proportions (though with small effects) between biological incest and general incidences of rape $X^2(1, N = 44,668) = 261.397, p < 001, OR = 2.05, 95\% CI [1.88, 2.24]$, as well as
between step incest and general incidences of rape $X^2(1, N = 42,569) = 45.058, p < 0.01$, OR = 2.18, 95% CI [1.93, 2.48]. (However, it should be noted that consensual sex is generally not punished among non-relatives, thus limiting the nonforcible cases of rape to either (a) nonforcible sex between an adult and a minor that was reported as statutory rape, or (b) cases of “incest” among individuals who were neither biological relatives, nor step-relatives, such as in-laws and other individuals included in the incest statutes that vary from state to state).

<table>
<thead>
<tr>
<th>Table 6. Forcible vs Nonforcible</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Bio Incest</td>
</tr>
<tr>
<td>Step Incest</td>
</tr>
<tr>
<td>General Rape</td>
</tr>
</tbody>
</table>

2.0 Hypothesis Testing

Hypothesis 1. Rates of step incest should exceed biological incest. In order to assess the difference between rates of biological incest and step incest, binomial analyses were conducted to test whether the proportion of incest victims who are assaulted by step offenders (parents and siblings, respectively) exceeded the rates of step-parentage and step-siblingship in the population. Because cases of both biological and step incest occurred overwhelmingly in the home (95% in both cases), as opposed to all other possible locations, and that the majority of victims were aged 18 or younger (90% in the case of step relatives, 91% in the case of biological relatives), contemporary proportions (U.S. Census Bureau, 2015) of children living with stepparents and stepsiblings were used for contingency table analysis.

In 2015, there were 3,671,633 children living with a step-parent in the United States, and 116,757,926 children living with a biological parent. In addition, there were
10,280,271 individuals living with a step-sibling the United States, and 46,996,901
individuals living with a biological. Cell counts are displayed in Tables 7 and 8.

<table>
<thead>
<tr>
<th>Table 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rates of Incest by Population Proportions (parent-child)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Cases of Incest In Population</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

*Note: $X^2(1, N = 120,432,737) = 8776.631, p < 0.001, OR = 14.71, 95% CI [13.65, 15.85]. Numbers in parentheses indicate row percentages.*

<table>
<thead>
<tr>
<th>Table 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rates of Incest by Population Proportions (sibling)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Cases of Incest In Population</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

*Note: $X^2(1, N = 57,279,211) = 33.324, p < 0.001, OR = 1.35, 95% CI [1.22, 1.50]. Numbers in parentheses indicate row percentages.*

In both cases, rates of incest exceeded those predicted by the rates of each
dynamic present in the population. While only 3% of people live with a step-parent, the
number of cases in which the victim was the offender’s step-child constituted 32% of all
parent-child incest cases. Likewise, while 18% of people live with step-sibling, the
number of cases in which the victim was the offender’s step-sibling constituted 23% of
all sibling incest cases.

*Hypothesis 2. Rates of biological mother-to-child incest should be significantly lower than other permutations.* The NIBRS variables Sex of Victim, Sex of Offender, and Relationship of Victim to Offender were used to calculate the number and percentage of each type of the following cases of incest (offender listed first): mother-child, father-child, brother-sibling, sister-sibling, stepmother-stepchild, stepfather-stepchild, stepsister-stepsibling, stepbrother-stepsibling.
In addition, U.S. Census data from 2015 was used to calculate absolute numbers of each relationship in the United States in 2015 (e.g., the number of mother-child pairs living together in the United States in 2015). With absolute numbers, rates of incest by relationship type were then calculated on a per-capita bases (e.g. how many cases of mother-child incest relative to the overall number of mother-child pairs).

In absolute terms, mother-child incest was of medial frequency among the relationships of interest; Table 9 presents the cases ranked from most to least common:

<table>
<thead>
<tr>
<th>Offender-Victim</th>
<th>No. of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>father-child</td>
<td>1,639 (37%)</td>
</tr>
<tr>
<td>brother-sibling</td>
<td>1,280 (29%)</td>
</tr>
<tr>
<td>stepfather-stepchild</td>
<td>868 (20%)</td>
</tr>
<tr>
<td>stepbrother-stepsibling</td>
<td>369 (8%)</td>
</tr>
<tr>
<td>mother-child</td>
<td>139 (3%)</td>
</tr>
<tr>
<td>sister-sibling</td>
<td>74 (2%)</td>
</tr>
<tr>
<td>stepsister-stepsibling</td>
<td>23 (.05%)</td>
</tr>
<tr>
<td>stepmother-stepchild</td>
<td>21 (.05%)</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>4,413 (100%)</strong></td>
</tr>
</tbody>
</table>

However, when the cases of incest are calculated as rates per offender-victim relationship, mother-child cases represent the lowest occurring frequency. Table 10 presents offender-victim relationships by frequency of incest cases, ranked from most frequent to least. Chi-square tests revealed an overall difference in frequencies of incest by offender-victim relationship \( \chi^2(7, N = 177,711,414) = 12,004.631, p < .001 \).

Moreover, pairwise chi-square analyses demonstrated that the frequency of mother-child incest was significantly lower than all other offender-victim combinations, including:

- sister-sibling, \( \chi^2(1, N = 89,229,704) = 6.931, p = .008 \), OR = 1.457, 95% CI [1.10, 1.93];
- stepsister-stepsibling \( \chi^2(1, N = 70,577,457) = 10.927, p = .001 \), OR = 2.071, 95% CI [1.33, 3.2];
- stepmother-stepchild \( \chi^2(1, N = 66,089,552) = 210.169, p < .001 \), OR = 13.446, 95% CI [8.50, 21.28];
- father-child \( \chi^2(1, N = 116,759,704) = 1673.208, p < .001 \),
OR = .067, 95% CI [0.056, 0.079]; brother-sibling \(\chi^2(1, N = 88,479,229) = 3017.377, p < .001\), OR = 0.038, 95% CI [0.032, 0.046]; stepbrother-stepsibling \(\chi^2(1, N = 70,413,614) = 3264.056, p < .001\), OR = 34.301, 95% CI [28.22, 41.69]; and stepfather-stepchild \(\chi^2(1, N = 68,293,378) = 16403.751, p < .001\), OR = 138.942, 95% CI [116.16, 166.19].

Table 10. Frequencies of Incest Cases

<table>
<thead>
<tr>
<th>Offender-Victim</th>
<th>No. of Cases</th>
<th>No. of Pairs in Population</th>
<th>Frequency of Incest Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>stepfather-stepchild</td>
<td>868</td>
<td>2,937,306</td>
<td>1 in 3,384</td>
</tr>
<tr>
<td>stepbrother-stepsibling</td>
<td>369</td>
<td>5,058,041</td>
<td>1 in 13,707</td>
</tr>
<tr>
<td>brother-sibling</td>
<td>1,280</td>
<td>23,122,475</td>
<td>1 in 18,090</td>
</tr>
<tr>
<td>father-child</td>
<td>1,639</td>
<td>51,402,861</td>
<td>1 in 31,362</td>
</tr>
<tr>
<td>stepmother-stepchild</td>
<td>21</td>
<td>734,327</td>
<td>1 in 34,968</td>
</tr>
<tr>
<td>stepsister-stepsibling</td>
<td>23</td>
<td>5,222,230</td>
<td>1 in 227,053</td>
</tr>
<tr>
<td>sister-sibling</td>
<td>74</td>
<td>23,874,426</td>
<td>1 in 322,627</td>
</tr>
<tr>
<td>mother-child</td>
<td>139</td>
<td>65,355,065</td>
<td>1 in 470,180</td>
</tr>
</tbody>
</table>

Note: \(\chi^2(7, N = 177,711,414) = 12,004.631, p < .001\).

Consistent with the findings reported above, for any given “type” of pair (i.e. parent-child, sibling-sibling), rates of offenses by the male variant were more frequent than the female counterpart (e.g., fathers had higher rates than mothers, brothers than sisters, stepfathers than stepmothers, stepbrothers than stepsisters), and offenses by step relatives more frequent than their biological counterparts (e.g., stepfathers had higher rates than biological fathers, stepmothers than mothers, stepbrothers than brothers, stepsisters than sisters). Furthermore, stepfather-stepchild incest had the highest frequency per capita. In fact, stepfathers rape stepchildren living with them at a higher rate (1 in 3,384) than males in the population commit rape, generally (1 in 4,271), \(\chi^2(1, N = 160,459,746) = 46.184, p < .001\), OR = 1.262, 95% CI [1.18, 1.35].

An exploratory logistic regression was performed using a forward conditional method to corroborate the effects of gender (male = 1, female = 0), genetic relationship (step = 1, biological = 0), and familial relationship (parent = 0, sibling = 1) on the likelihood of committing incest (yes = 1, no = 0). The initial model, displayed in Table
11a below, was statistically significant $\chi^2(3) = 6081.112, p < .001$ and the model explained .06% (Nagelkerke $R^2$) of the variance in incest offending. Gender and genetic relationship were both statistically significant, with the odds of males committing incest more than 17 times that of females, and the odds of step-relatives offending nearly 4 times that of biological relatives. Familial relationship was not statistically significant, indicating that there was no significant difference between parents and siblings in incest offending, when controlling for gender and familial relationship.

A second exploratory logistic regression was conducted which included all three predictor variables, as well as all interactions between those variables. The logistic regression model was statistically significant $\chi^2(7) = 6901.036, p < .001$ and the model explained .07% (Nagelkerke $R^2$) of the variance in incest offending. As shown in Table 11b, all three binary predictor variables remained significant. However, when all interactions are included, only the familial relationship by genetic relationship interaction has significant effects above and beyond what is explained by the predictors. All other interactions were not significant. This suggests that the relative frequency of some types of incest (e.g., stepfather) and relative infrequency of other types (e.g., mother), when all permutations are included in the model, may be accounted for by the influences of gender, genetic relationship, and familial relationship, but not necessarily by any phenomena arising from the combination of those predictors above and beyond what is explained by the predictors themselves.
Table 11.
a. Logistic Regression Results of Gender, Genetic Relationship, and Familial Relationship on Likelihood of Committing Incest.

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
<th>95% C.I. Lower</th>
<th>95% C.I. Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender</td>
<td>2.844</td>
<td>.064</td>
<td>1953.441</td>
<td>1</td>
<td>.000</td>
<td>17.188</td>
<td>15.151</td>
<td>19.498</td>
</tr>
<tr>
<td>genetic relation</td>
<td>1.377</td>
<td>.035</td>
<td>1554.742</td>
<td>1</td>
<td>.000</td>
<td>3.964</td>
<td>3.702</td>
<td>4.245</td>
</tr>
<tr>
<td>familial relation</td>
<td>.042</td>
<td>.032</td>
<td>1.695</td>
<td>1</td>
<td>.193</td>
<td>1.043</td>
<td>.979</td>
<td>1.111</td>
</tr>
<tr>
<td>Constant</td>
<td>-13.018</td>
<td>.067</td>
<td>38275.905</td>
<td>1</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

b. Logistic Regression Results of Gender, Genetic Relationship, and Familial Relationship on Likelihood of Committing Incest, with interactions included.

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
<th>95% C.I. Lower</th>
<th>95% C.I. Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender</td>
<td>-2.335</td>
<td>.221</td>
<td>111.824</td>
<td>1</td>
<td>.000</td>
<td>.097</td>
<td>.063</td>
<td>.149</td>
</tr>
<tr>
<td>genetic relation</td>
<td>-2.227</td>
<td>.042</td>
<td>2812.684</td>
<td>1</td>
<td>.000</td>
<td>.108</td>
<td>.099</td>
<td>.117</td>
</tr>
<tr>
<td>familial relation</td>
<td>-1.399</td>
<td>.062</td>
<td>506.615</td>
<td>1</td>
<td>.000</td>
<td>.247</td>
<td>.219</td>
<td>.279</td>
</tr>
<tr>
<td>gender by genetic</td>
<td>-.372</td>
<td>.238</td>
<td>2.448</td>
<td>1</td>
<td>.118</td>
<td>.689</td>
<td>.432</td>
<td>1.099</td>
</tr>
<tr>
<td>gender by familial</td>
<td>-.472</td>
<td>.308</td>
<td>2.345</td>
<td>1</td>
<td>.126</td>
<td>.624</td>
<td>.341</td>
<td>1.141</td>
</tr>
<tr>
<td>genetic by familial</td>
<td>1.951</td>
<td>.072</td>
<td>724.127</td>
<td>1</td>
<td>.000</td>
<td>7.033</td>
<td>6.101</td>
<td>8.106</td>
</tr>
<tr>
<td>gender by genetic by familial</td>
<td>.297</td>
<td>.342</td>
<td>.753</td>
<td>1</td>
<td>.386</td>
<td>1.346</td>
<td>.688</td>
<td>2.631</td>
</tr>
<tr>
<td>Constant</td>
<td>-8.127</td>
<td>.034</td>
<td>57310.183</td>
<td>1</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

Hypothesis 3. The age distribution of incest victims should track fertility. Among cases of biological incest between male offenders and female victims, 17 cases were excluded because they did not have information regarding the victim’s age, leaving N = 2,389 cases. Table 12 shows the distribution of incest victims by age.
Table 12. Incest Victims by Age

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>493</td>
<td>5.7%</td>
<td>20.6%</td>
</tr>
<tr>
<td>6-10</td>
<td>610</td>
<td>25.6%</td>
<td>46.2%</td>
</tr>
<tr>
<td>11-15</td>
<td>787</td>
<td>32.9%</td>
<td>79.1%</td>
</tr>
<tr>
<td>16-20</td>
<td>299</td>
<td>12.5%</td>
<td>91.6%</td>
</tr>
<tr>
<td>21-25</td>
<td>78</td>
<td>3.3%</td>
<td>94.9%</td>
</tr>
<tr>
<td>26-30</td>
<td>31</td>
<td>1.3%</td>
<td>96.2%</td>
</tr>
<tr>
<td>31-35</td>
<td>29</td>
<td>1.2%</td>
<td>97.4%</td>
</tr>
<tr>
<td>36-40</td>
<td>12</td>
<td>.5%</td>
<td>97.9%</td>
</tr>
<tr>
<td>41-45</td>
<td>15</td>
<td>.6%</td>
<td>98.5%</td>
</tr>
<tr>
<td>46-50</td>
<td>15</td>
<td>.6%</td>
<td>99.1%</td>
</tr>
<tr>
<td>50+</td>
<td>20</td>
<td>.9%</td>
<td>100%</td>
</tr>
<tr>
<td>Totals</td>
<td>2,389</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 13 displays the distribution of victim age for cases of general rape involving male offenders and female victims.

Table 13. Rape Victims by Age

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>1,229</td>
<td>3.7%</td>
<td>3.7%</td>
</tr>
<tr>
<td>6-10</td>
<td>1,776</td>
<td>5.4%</td>
<td>9.1%</td>
</tr>
<tr>
<td>11-15</td>
<td>9,511</td>
<td>29.0%</td>
<td>38.1%</td>
</tr>
<tr>
<td>16-20</td>
<td>7,396</td>
<td>22.6%</td>
<td>60.7%</td>
</tr>
<tr>
<td>21-25</td>
<td>3,830</td>
<td>11.7%</td>
<td>72.4%</td>
</tr>
<tr>
<td>26-30</td>
<td>2,683</td>
<td>8.1%</td>
<td>80.5%</td>
</tr>
<tr>
<td>31-35</td>
<td>1,974</td>
<td>6.1%</td>
<td>86.6%</td>
</tr>
<tr>
<td>36-40</td>
<td>1,342</td>
<td>4.0%</td>
<td>90.6%</td>
</tr>
<tr>
<td>41-45</td>
<td>1,021</td>
<td>3.2%</td>
<td>93.8%</td>
</tr>
<tr>
<td>46-50</td>
<td>872</td>
<td>2.6%</td>
<td>96.4%</td>
</tr>
<tr>
<td>50+</td>
<td>1,180</td>
<td>3.6%</td>
<td>100%</td>
</tr>
<tr>
<td>Totals</td>
<td>32,798</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Congruent with the existing literature, non-incestuous rape victims in this study fell primarily (82%) within fertile ages (11-40), with more than half of victims (52%) between ages 11-20. The majority of female incest victims (52%) were also within fertile ages, with 45% of victims aged between 11-20. However, while the modal age of victims was the same (15) for both incest and rape victims, and while the largest proportion of cases fell within the 11-15 age range for both groups (33% for incest, 29% for rape) the mean age of incest victims ($M = 11.18$, $SD = 8.23$), was significantly younger than that of rape victims ($M = 21.74$, $SD = 12.38$), $t(36,554) = -70.06$, $p < .001$ (Levene’s test
indicated unequal variances, $F = 743.83, p < .001$, so degrees of freedom were adjusted from 36,554 to 5,913). Moreover, the proportion of pre-pubescent victims (younger than age 11) was significantly greater in cases of incest (46%) than in general cases of rape (9.1%), $X^2(1, N = 35,187) = 2957.569, p < .001$, OR = .118, 95% CI [0.108, 1.29]. A two sample Kolmogorov-Smirnov test confirmed that the age distributions were significantly different for incest victims and rape victims, $D (36,556) = 28.69, p < .001$. Figures 1 and 2 show histograms of the distributions of victim ages for cases of incest (Figure 1) and rape (Figure 2) under 40.

**Figure 1.** Age Distribution of Incest Victims Under Age 40.

![Figure 1](image1.png)

**Figure 2.** Age Distribution of Rape Victims Under Age 40.

![Figure 2](image2.png)
The age distribution of victims of step-incest was also significantly different from both biological incest, \( D (5,029) = 7.68, p < .001 \), and general rape, \( D (34,069) = 12.49, p < .001 \). The mean age of step-incest victims (\( M = 13.53, SD = 6.77 \)) was significantly older than that of incest victims, \( t(2,634) = -10.09.06, p < .001 \) (Levene’s test indicated unequal variances, \( F = 40.86, p < .001 \), so degrees of freedom were adjusted from 5,027 to 2,634), and significantly younger than that of rape victims, \( t(1,620) = -40.69, p < .001 \) (Levene’s test indicated unequal variances, \( F = 460.66, p < .001 \), so degrees of freedom were adjusted from 34,067 to 1,620)). The modal age of step-incest victims was 13. The proportion (28%) of victims younger than 11 was also significantly greater than in general cases of rape, \( X^2(1, N = 34,069) = 496.732, p < .001, OR = 3.857, 95\% CI [3.45, 4.32] \) and significantly lower than in cases of incest \( X^2(1, N = 3,660) = 2.957, p = .086, OR = .454, 95\% CI [0.40, .52] \).

To further probe these results, a series of exploratory analyses were pursued. First, the distribution of incest victim ages was compared against birth rates in the United States for 2015 (Hamilton, Martin, & Osterman, 2015). Births by age of mother for 2015 are displayed in Table 14.

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-14</td>
<td>2,503</td>
</tr>
<tr>
<td>15-19</td>
<td>229,888</td>
</tr>
<tr>
<td>20-24</td>
<td>851,142</td>
</tr>
<tr>
<td>25-29</td>
<td>1,152,660</td>
</tr>
<tr>
<td>30-34</td>
<td>1,093,898</td>
</tr>
<tr>
<td>35-39</td>
<td>527,168</td>
</tr>
<tr>
<td>40-44</td>
<td>111,611</td>
</tr>
<tr>
<td>45-54</td>
<td>8,876</td>
</tr>
<tr>
<td>Totals</td>
<td>3,977,745</td>
</tr>
</tbody>
</table>
Even though birth rates, particularly in industrialized nations, are not necessarily a good proxy for fertility or reproductive capacity (Sear, Lawson, Kaplan, & Shenk, 2016), this exploratory analysis was conducted to have another point of reference. In order to reduce the data to size that allows for distribution comparison, birth frequencies were each divided by 100 (which did not affect the nature of the distribution). A two sample Kolmogorov-Smirnov test confirmed that the age distributions were significantly different for incest victims and birth rates, $D(41,450) = 32.16, p < .001$.

Next, a test for bimodality (Frankland & Zumbo, 2002) was conducted on the ages of biological incest victims, setting the bin size of one distribution at ages 1-10 ($M = 6.03, SD = 2.43$) and the other at ages 11-20 ($M = 14.28, SD = 2.19$), with a mixing proportion of 0.5 and a constant of 0. The values returned by the algorithm (Frankland & Zumbo, 2000) were $6.00 \pm .005$ for the first mean, $13.52 \pm .071$ for the second mean, $0.065 \pm .000$ for the mixing proportion, and $4.68 \pm .636$ for the constant. For the bimodal data, $SS_{error} = 96.18$ and $R^2_{\hat{y}} = .106$, $X^2(16, N = 2,897) = 963.068, p < .001$, implying that the model differed significantly from the data and that the data was not bimodally distributed.

To explore whether the distribution of victim ages varied as a function of the offender-victim relationship (e.g., father-child, mother-child, brother-sibling, sister-sibling) the distribution of biological incest victims by age was separated into four separate distributions, as a function of the offender’s sex (male or female) and relationship to victim (parent or sibling). Figure 3 displays the four separate distributions for victims of incest, and Figure 4 displays the four separate distributions for step-incest, for a point of comparison.
Figure 3. Biological Incest Victim Age Distribution as a Function of Offender Sex by Relationship to Victim

Note: Clockwise from the upper left, offenders are the victims’: mothers, fathers, brothers, and sisters.

Figure 4. Step-Incest Victim Age Distribution as a Function of Offender Sex by Relationship to Victim

Note: Clockwise from the upper left, offenders are the victims’: stepmothers, stepfathers, stepbrothers, and stepsisters.
Finally, to probe whether there may be two separate psychological processes fueling biological incest (one that tracks fertility, and another that underlies the targeting of pre-pubescent victims), the distribution of rape victim ages under 40 was “removed” from the distribution of incest victim ages under 40 by converting each distribution of frequencies into a distribution of proportions, and then subtracting the rape victim age values from their corresponding incest victim age values. If the resulting values for any age fell below zero, they were coded as zeroes. A clustered bar chart showing the distribution of proportions for each of the biological incest victim ages and rape victim ages in displayed in Figure 5 below. The resulting distribution after subtraction is displayed in Figure 6 below.

**Figure 5.** Victim Age Distributions as Percentages for Incest and Rape Victims Under 40

*Note: Incest victims are coded in blue, rape victims coded in green.*
Figure 6. Age Distribution of Incest Victims with Distribution of Rape Victim Ages Removed

Note: Negative values coded as zeros.
CHAPTER 3: GENERAL DISCUSSION

Consistent with the predictions generated by the EPI theoretical model, the findings reported here demonstrate that, among all reported cases in the United States for 2015:

- Males constituted 93% of all biological incest offenders and were almost 14 times more frequent than female offenders.
- Females constituted 78% of all biological incest victims and were roughly 3.5 times more frequent than male offenders.
- The combination of a male offender and female victim in cases of biological incest accounted for 82% of all cases and was more than three times as likely as all other combinations combined.
- Forcible cases of biological incest constituted 82% of all cases and were roughly 4.5 times more frequent than nonforcible cases.
- The proportion of incest cases of committed by a step relative significantly exceed the rates predicted by population proportions, with stepsiblings offending at a rate 1.28 times greater their prevalence in the population, and stepparents offending more than 10 times greater than population rates.
- Incest between a biological mother and her child is the rarest type of incest on a per capita basis, with 1 case of incest occurring for every 470,180 mother-child pairs in the United States.
By contrast, incest between a stepfather and stepchild was the most frequent type, with 1 case occurring for every 3,384 pairs. This frequency is so great that it exceeds the rate at which males commit rape generally.

For any given “type” of offender (e.g., parent), the male variant (i.e. father) offended at a greater rate than the female variant, and the step variant (i.e. stepfather) offended at a greater rate than the biological.

The majority of female incest victims fell within fertile ages (11-40), with a modal age of victims at 15, and the largest proportion of cases falling between the ages of 11-15.

These findings support the view that incest can, in many cases, be conceptualized as an otherwise functional mating mechanism that has been deprived of the cues necessary to register kin. Conversely, one aspect of the EPI model presented here was seriously challenged. While a majority of female incest victims fell within fertile ages, a conspicuously large proportion of incest victims were pre-pubescent. Forty-six percent of all female incest victims were younger than age 11, a proportion that not only deviates from the logic of the EPI model, but also deviates from the proportion of pre-pubescent victims of rape (9%) and step-incest (28%) reported in this study, and from typical proportions of prepubescent rape victims (10%-30%) reported in prior research (see Thornhill & Palmer, 2000 for a review).

This finding raises at least three possibilities. First, it raises the possibility that rapists would actually select younger victims than are typically observed if they were given the opportunity. Because most children under 11 are rarely unsupervised or without
their parents, it creates an asymmetry of opportunity: children are at once highly exposed to family members within the home, and at the same time seldom left vulnerable to individuals outside that demographic. That the proportion of pre-pubescent victims of step-incest (28%) falls in between the proportion of pre-pubescent rape victims (9%) and biological incest victims (46%), lends some limited support for this idea. If this were indeed the case, then the ostensible conflict with a reproductive theory of rape would need to be accounted for.

Second, it raises the possibility that incestual and pedophilic urges have a common underlying cause or are otherwise somehow related. In this scenario, some factor that is impairing an individual’s aversion to sex with kin is also impairing their aversion to sex with children. Though missing kinship cues would presumably be unable account for such a phenomenon, other factors, such as the inability to obtain other mating opportunities, might play such a role (Finkelhor, 1984; Fossett & Kiecolt, 1993; Lieberman & Patrick, 2018).

Third, there is a possibility that in cases of biological incest, there are two separate processes at work, each represented by the distribution of victim ages clustered around the two peaks (e.g., at 4 years old and at 15 years old). While the distribution clustered around 15-year-old victims is congruent the EPI model presented here (i.e., as reproductive targets by offenders who have not registered kinship) and similar to the distribution of rape victims, the separate distribution of pre-pubescent victims clustered around the mode of 4 year old victims may be due to a separate psychological cause. One potential explanation for pre-pubescent incest is that it allows siblings or children to experiment sexually when the reproductive stakes are low. However, because victims of
both sibling and parental incest frequently report trauma (e.g., Owen, 1998) the “sex play” explanation would have to assume that the net fitness benefits resulting from such experimentation outweigh the inclusive fitness costs associated with any trauma or other harmful consequences. Among primates, the observation of sons sometimes (though infrequently) mounting their mothers has been explained as serving the function of either ontogeny or stress reduction, given that (1) the males are usually sexually immature, (2) the mother is frequently anestrous when mounted, and (3) the male is most likely to mount when upset (Bixler, 1981). However, given the relative infrequency of mother-child incest relative to other types (e.g., father-child), and given the frequency with which incest victims report experiencing trauma (e.g., Owen, 1998), the explanation of incest as a comforting mechanism also seems inadequate. Future work should explore this unexpected finding.

Several ancillary findings also oblige consideration. For example, the proportion of female offenders was greater in cases of biological incest (6.8%) than in cases of either step incest (3.5%) or general rape (3.1%). Further, in cases of biological incest, male offenders targeted male victims (18%) at a greater rate than male offenders in cases of step incest (9%) or general rape (5%). And while male incest offenders principally targeted female victims (82%), female incest offenders targeted male (51%) and female (49%) victims at almost even rates.

Taken together with the age proportions of victims reported above, these findings suggest that while biological incest offenses are still largely committed by male offenders with reproductively aged female victims, they also involve more female offenders, more same-sex victims, and more pre-pubescent victims than cases of step incest or general
rape. These findings imply that (a) in addition to impaired kinship estimates, other factors may mediate or contribute to incestuous inclinations, and (b) these factors may also influence sexual propensities extending beyond incest. One potential avenue for future research is to consider why and how these various sexual propensities might be related to each other. (One possibility, suggested above, is that they reflect a general tendency of someone with few viable mating options to seek prospective mates that might otherwise be considered suboptimal from a reproductive perspective – including those of pre-reproductive ages or of the opposite sex.)

**Limitations**

There are several limitations of this study, both theoretical and methodological. In theory, several of the findings reported in the descriptive analyses may be attributable to causes other than those hypothesized by the EPI model. For instance, males are disproportionately responsible for many crimes in addition to incest (Daly & Wilson, 1988). There is no certainty that the relative “maleness” of incest offenders is due to the fragility of male kinship estimates and the asymmetric risks associated with inbreeding, as opposed to some other male characteristic, such as a propensity for risk-taking (Wilson & Daly, 1985). By the same token, there is no certainty that the relative “femaleness” of incest victims is due to their reproductive potential, as opposed to some other female characteristic, such as a greater physical vulnerability (Lasseck & Gaulin, 2009).

Methodologically, there are several limitations associated with reporting, including the risk that agencies reporting to the NIBRS submit inaccurate or incomplete reports of their offenses. Moreover, to the extent that law enforcement agencies are relying on victim reports of relationships, there is always the chance that a purported
relationship (e.g., that the offender is the victim’s biological father) or other relevant piece of information is inaccurate.

It is also well documented that sex offenses are notoriously underreported (Department of Justice, 2015; Department of Justice 2013). In nonforcible cases of incest, for example, the worry is simply that there is no one to report: unless a family member or other person close to the incestuous dyad chooses to turn them in, or if one of the participants has a change of heart, there is no obvious reason to assume that such a relationship would be known or documented by law enforcement. Even where the relationship is forcible, victims of sexual offenses often choose not to come forward for a number of reasons, and studies relying on anonymous victim surveys estimate that only 15-35% of all non-consensual cases are reported (Department of Justice, 2015; Department of Justice 2013). Thus, the vast underreporting of both forcible and nonforcible case of incest makes it difficult to be certain of true frequencies.

Conclusion

Going forward, researchers interested in predicting, explaining, and preventing incest would do well to pay increased attention to the individual characteristics of offenders, instead of focusing exclusively on the dynamics of the home. Even in cases where households have otherwise healthy emotional relationships, and where the home environment is not highly sexualized, those tasked with the care and protection of children should be cognizant of the heightened risks associated with introducing (or re-introducing) members into the household (whether step, biological, or otherwise) that have not been sufficiently exposed to the cues necessary to register kinship.
Reasoning on the logic generated by the currently dominant theoretical models of incest, researchers frequently recommend preventative measures that focus on ‘negative imprinting’ or a ‘conditioned inhibition of sexual behavior’ (e.g., Griffee et al., 2014; Haskins, 2003). In other words, the common preventative advice is to discourage incest and to teach children, when they are in critical learning periods, to avoid incest. However, the findings here suggest that families may also want to take steps to ensure that family members are, where possible, exposed to the relevant kinship cues underlying sexual aversions to kin. One simple example might be for mothers to endeavor to care for (and especially breastfeed) siblings in front of one another, so that her children might register the MPA responsible for registering each other as kin. Another suggestion might be for couples who are actively trying to conceive to try to avoid any prolonged absences from one other during this time, to avoid potentially weakening the father’s cognitive assessment of paternity. Of course, many of these options might prove onerous or otherwise objectionable to family members, but given their (a) potential impact, (b) absence from the preventative literature, and (c) nonintuitive nature, scholars and practitioners should nonetheless give them further attention.
References


