Cousin Marriage, Honour, and Violence Against Women: A Cross-Cultural and Behavioural Ecological Approach

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I, Olympia Campbell, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the work.

ABSTRACT

Violence against women has been prevalent in societies throughout history and continues to be common today. However, rates of violence have varied over time and across cultures, with certain parts of the world experiencing higher levels of violence than others. Additionally, the types and perpetrators of violence against women also vary, including intimate-partner, sexual, and honour-based violence. Honour-based violence is unique, in that it tends to be perpetrated by male kin such as fathers, brothers, and uncles. While much research has focused on intimate partner and sexual violence, honour-based violence remains relatively understudied.

Drawing on anthropological theory that suggests honour-related violence may be associated with cousin marriage and combining it with behavioural ecological literature on parent-offspring and sexual conflict, this thesis provides one of the first quantitative analyses on the demographic origins of honour-based violence. Support for this hypothesis varies depending on the level of analysis. While at the individual level cousin marriage appears to be protective against both intimate-partner violence and honour-based violence, at the regional or population level, cousin marriage is positively associated with the strength of an honour culture. An analysis of media reports of honour killings in Pakistan indicates that cousin marriage is not associated in this context, although this may be due to an asymptotic relationship, However, honour killings are responsive to the sex ratio, being less common where females are scarce, in line with mating market theory. Results from this thesis add to the growing literature on the evolution of patriarchy and the effects of adopting an intensive kinship structure on norms and beliefs.

IMPACT STATEMENT

Violence against women is a global health issue that has been the focus of much research effort, particularly since 1979 when the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) was adopted by the UN General Assembly. Significant progress has been made in measuring and collecting data on sexual violence and intimate partner violence and in elucidating the risk factors and correlates of violence. Despite this, honour-based violence remains relatively under researched, and it is unclear to what extent it is similar or different to the other forms of violence against women. Similarly, little is known about the underlying ecological environment that may cause this particular form of violence against women to emerge. In this thesis, I apply insights from across the social sciences, but particularly human behavioural ecology, to understand whether cousin marriage and intensive kinship are important factors in the emergence of honour cultures and honour-based violence. I also compare the different types of violence against women. Largely, this thesis poses a historical question: was cousin marriage an important driver of the emergence of honour cultures, and therefore there may be little of practical use to policy makers or the charity sector. However, the results presented in thesis indicate that the risk factors for honour-based violence may well be different to other forms of violence against women, which has implications for how they are researched going forward. Secondly, exploratory analyses such as those presented here remain a key component in the cycle of hypothesis testing and generating further theory that may well have greater impact going forward. Lastly, this thesis forms part of a broader set of questions relating to the evolution of patriarchy and why we see global variation in the way that humans structure their societies around kin. These are, of course, of academic interest, but they are also of popular interest as they form part of that larger question, of what it means to be human.

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CHAPTER 1: EVOLUTIONARY THEORY, FEMINISM, AND VIOLENCE AGAINST WOMEN

"Patriarchy is the product of reproductive strategies typically shown by male primates, which in humans have undergone unusually effective elaboration."

Barbara Smuts (Smuts, 1995)

Patriarchal systems have been a common feature of human societies, leading some to perceive it as the natural order. Patrilineal systems, where kinship is traced through the father, are more prevalent than matrilineal societies, where kinship is traced through the mother, making up 41% and 17% of societies in the Standard Cross-Cultural Sample, respectively (Murdock and White, 1969). However, cultural variations, including the presence of matriliny, challenge the notion of universal patriarchy. While Victorian women were almost entirely unable to seek divorce or own property (Shanley, 1989), the Amdo Tibetans of Maqu in China practise trial marriages, in which both sexes can initiate divorce and retain their wealth on separation (Du and Mace, 2019). Where Turko-Mongol women often move tens of kilometres to their husband's homes, isolating them from their natal family (Marchi et al., 2018), the Mosuo practise walking marriage, where women remain in their natal home and their husbands visit them at night (Ji et al., 2013). Even polygyny, where a man has multiple wives, commonly thought to be an oppressive practice, has mixed outcomes. In the Dogon of Mali polygyny was associated with an increased risk of child mortality, indicating that women may well be being coerced into these marriages (Strassmann, 2011, 1997), yet in Tanzania, polygynous households had improved child outcomes, indicating instead that female choice was at play (Lawson et al., 2015).

Violence against women also varies significantly across societies. For instance, rates of physical violence from intimate partners are reported to be 13% in Japan but as high as 61% in Peru (García-Moreno et al., 2005). As does the importance put on female virginity and promiscuity. Amongst the Himba of Namibia, both men and women frequently have concurrent partners and men happily raise the children of their wives' boyfriends (Scelza et al., 2020). By contrast, in much of the Middle East, North Africa, and Central Asia codes of honour and the practice of purdah (from the Hindi-Urdu word *parda* meaning curtain) governs the veiling and seclusion of women and their exposure to non-kin men, sometimes to the complete isolation of women from the outside world (Pastner, 1972).

This area of the world containing parts of North Africa, the Middle East, and Central Asia has sometimes been referred to as the patriarchal belt, characterised by its emphasis on the male patriarch, strong son preference, sex segregation, and *particularly* limiting restrictions on female behaviour through codes of honour (Caldwell, 1978; Kandiyoti, 1988). In some areas, the preoccupation with female virginity, and female behavioural conduct in general, is so strong that accusations of sexual

misconduct can lead to honour killings, where a girl is murdered for dishonouring her family. This raises the question: given the diverse ways in which gender dynamics are shaped across cultures, why are some parts of the world *particularly* patriarchal and why do some societies create means of gendered subordination that are *particularly* elaborate? This thesis is situated within this broader question but focuses specifically on violence against women and honour cultures as one manifestation of patriarchy. To answer this question, I apply an evolutionary framework, including theories of sexual and parent-offspring conflict. Before delving into the evolutionary theory guiding this thesis, I will summarise the history of Darwinian Feminism.

1.1 DARWINIAN FEMINISM

"But now arises a question which — taken away from the protection of accepted tradition — is rather unexpectedly thrust forward for purely scientific recognition and settlement".

Antoinette Brown Blackwell on the question of female intellect (Blackwell, 1875)

Applying a Darwinian perspective to the topic of violence against women has been a contentious approach, often sparking animosity between feminist theorists and proponents of evolutionary frameworks. Critics of the evolutionary approach dismiss it as deterministic, while some evolutionary theorists have been confrontational, portraying non-evolutionary approaches as ideological rather than scientific and truthful (see Vandermassen (2011) for a summary of the controversy surrounding Thornhill and Palmer's Natural History of Rape).

Historically, Darwinian theory has been misused to support essentialist views of gender and the notion of innate gendered social outcomes. In the Victorian era, it was suggested that men were more evolved than women, and this underlay the purported sex-based differences in intellectual abilities (Blackwell, 1875). Even Darwin himself proclaimed that "man has ultimately become superior to woman" and reflected on the luck of the existence of the law of equal transmission else "it is probable that man would have become as superior in mental endowment to woman, as the peacock is in ornamental plumage to the peahen". More recently, evolutionary theory has been used by the 'manosphere', a loose collection of blogs and YouTube channels that promote self-improvement advice for men alongside anti-feminist rhetoric and misogyny, as an evidence base for their worldview (Bachaud and Johns, 2023).

However, Darwinian theory also paved the way for feminists, such as Antoinette Brown Blackwell, to challenge biological essentialism (Brilmyer, 2017). Properly understood, Darwin's theory makes

clear that female agency and female choice is extremely important in understanding the differences and relationship between the sexes. Whilst before, the question of women's nature and intellect had the "protection of accepted tradition", now it was open to scientific debate. What Darwin offered was the idea that all traits, including sex differences, were inherently mutable and environmentally contingent. Futures in which gender differences were transformed or indeed removed entirely, were now imaginable.

By the 90's feminist evolutionary biologists such as Barbara Smuts, Sarah Blaffer Hrdy, and Patricia Gowaty were using anthropology, primatology and behavioural ecology to understand the huge biological and cultural variability in the outcomes of sexual conflict (Gowaty, 1992; Hrdy, 2009, 1981; Smuts, 1995). Smuts particularly speculated on the drivers of male coercion and violence against women, linking it to male reproductive strategies and highlighting ecological factors that might predispose some cultures to higher levels of violence and also the inverse, those factors that produce human societies with lower levels of violence against women (Smuts, 1995, 1992). Foundational principles from this early work highlighted subsistence, residence, and inheritance patterns as being highly instrumental in how power sharing is played out between the sexes. This evolutionary research also built upon a rich anthropological literature documenting the wide cultural range of gender roles and ideology, which had, since the 60s, been used as evidence in favour of sexual liberation (Rosaldo and Lamphere, 1974).

Whilst the idea that men are 'more evolved' than women has been debunked, some evolutionary research has perpetuated stereotypical beliefs about gender roles and psychology: women are chaste whereas men are promiscuous; women care while men provide; women want rich and older husbands, while men want young fertile wives. Other research, perhaps more common to the subfield of Human Behavioural Ecology has challenged these beliefs, demonstrating that these characteristics are ecologically contingent. Research in this domain has emphasised the variability in what is considered physically attractive (Tovée et al., 2006), undermined assumptions about 'natural' family structures and divisions of labour (Hrdy, 2009; Sear, 2021; Sear and Mace, 2008), and demonstrated the potential benefits of female promiscuity (Scelza et al., 2020; Scelza, 2013). The importance of this work was not to prove that these gender stereotypes do not occur, of course they do, but to demonstrate that they are not universal.

The rest of this introductory chapter will introduce the theories and concepts from evolution, namely from the human behavioural ecological subfield, that have been applied to explain the evolution of patriarchy and violence against women. Secondly, I will summarise the types of violence against women. Finally, I will provide an overview of the thesis.

1.2 EVOLUTIONARY THEORETICAL PERSPECTIVES

1.2.1 TINBERGEN'S FOUR WHY'S

The main difference between evolutionary and other approaches lies in their analytical focus (Laland et al., 2011; Mayr, 1961; Tinbergen, 1963). Ernst Mayr (1961) introduced distinguishing between proximate and ultimate levels of causation. The evolutionary explanations concentrate on the ultimate level of explanation, which refers to the reason why a behaviour evolved and relates to both adaptive significance as well as evolutionary history. By contrast, proximate explanations are concerned with more immediate reasons as to why something exists, such as how it developed or what the mechanism behind it is. Tinbergen (1963) formalised the proximate and ultimate distinction into four categories of questions, each of which asks 'why', but at a different level of explanation (Table 1-1). These different ways of asking why are complementary rather than contradictory and are a useful heuristic for thinking about how to explain any feature of an organism, including culture.

Table 1-1: Tinbergen's four why's

Proximate	**Development** How does the behaviour develop in the individual?	**Mechanism** How is the behaviour caused? What triggers elicit this behaviour or what physiological mechanisms must occur?
Ultimate	**Function (or adaptive significance)** How does the trait increase the organism's fitness? Either survival or reproduction.	**Phylogeny** How did the behaviour evolve? What is its phylogenetic history?

An evolutionary approach does not suppose that the ultimate function of a behaviour is a conscious objective in an individual's mind. Furthermore, it does not imply that a system is good simply because it has evolved. The naturalistic fallacy, conflating what exists with what is morally good or desirable, should be avoided. Instead, it acknowledges that the emotional states that motivate behaviours often serve an evolutionary purpose. To use a benign example, eating to alleviate hunger satisfies the *ultimate function* of preventing starvation but the *proximate mechanism* that causes this behaviour will be the psychological feeling of hunger. In terms of why a woman is suffering from domestic abuse from her husband we might apply Tinbergen's framework as follows:

- Development: The individual was abused as a child leading to ostracism and a greater likelihood of choosing a similarly disadvantaged romantic partner (Manchikanti Gómez, 2011).
- Mechanism: Suspicions of infidelity trigger the violence (Goetz and Romero, 2011).
- Function: Violence prevents the woman from leaving the relationship, increasing a man's fitness through continued sexual access (Buss and Duntley, 2011).
- Phylogeny: Violence towards females by males is common amongst other ape and mammalian species as a means of mate guarding and sexual coercion (Polo et al., 2014).

Human behavioural evolutionary theorists tend to fall into three disciplinary camps – human behavioural ecology (HBE), evolutionary psychology (EP), and cultural evolution (CE), which are reviewed briefly here.

Human Behavioural Ecology

Human behavioural ecology, which is the primary discipline applied in this thesis, tends to focus on the function of a behaviour and how it might increase an individual's fitness. HBE tends to remain agnostic about the specific mechanism behind a behaviour, instead employing the 'phenotypic gambit', which posits that how behaviour is genetically controlled does not need to be incorporated into models of the function of behaviour (Grafen, 1984; Laland and Brown, 2011). Behavioural ecologists also start from the assumption that natural selection works on behaviour to maximise fitness and since the environments that humans have colonised are highly variable, this fitness-maximising behaviour is also highly plastic. Since humans are fitness maximisers, HBE also assumes that humans are able, at some level, to perform cost-benefit analyses leading to the adoption of fitness-maximising behaviour. Furthermore, many human adaptations are cultural adaptations, in that they solve an adaptive problem through cultural means, rather than having to evolve a trait genetically. HBE also takes the view that selection acts on the gene or individual and views group-level characteristics as emergent properties of these individual-level decisions. Overall, behavioural ecologists predict that human behaviour will vary optimally according to the local environment, which does appear to often be the case (Barsbai et al., 2021).

Cultural Evolution

Cultural evolution (CE) is a somewhat muddy term and is often used to refer to both how culture changes through time and the mechanisms of this change, such as through transmission biases like prestige bias (Boyd and Richerson, 1988a; Micheletti et al., 2022a). In many ways, human behavioural ecology and cultural evolution are similar, as both are interested in how culture evolves, given that most human adaptations are cultural ones (Mace, 2014). CE also posits that some traits, such as large-scale cooperation, can evolve through cultural group selection where more successful groups outcompete less successful groups (Henrich, 2004). Whilst classic group selection tends to be dismissed because it requires high genetic differentiation between groups that is unlikely to exist,

some have argued that cultural differentiation may be high enough as a result of transmission biases such as conformism (Henrich, 2004; Richerson et al., 2016); but such mechanisms are contested by those who believe individual level selection can explain higher-order adaptations such as institutions (Lehmann et al., 2022; Micheletti et al., 2017; Powers and Lehmann, 2013).

CE also includes gene-culture co-evolution where cultural practices create selective pressures of their own that go on to affect genetic evolution. The clearest examples tend to come from work to understand the genetics of physiological adaptations, the most famous of which is dairy farming leading to the evolution of lactase persistence (Swallow, 2003). Recent evidence also suggests that famine and disease, as a result of transitions to agriculture and increasing population density, may also have driven lactase persistence (Evershed et al., 2022).

Evolutionary Psychology

Evolutionary psychology (EP) focuses on how human psychology has been shaped by evolution and believes that our mind was mostly formed during the environment of evolutionary adaptiveness (EEA), which is usually considered to be the Pleistocene (Tooby and Cosmides, 1990). Often this leads to an assumption that there will be a mismatch between our cognition and our contemporary environment, given the extent to which our modern environment has changed, leading to maladaptive behaviour. Unlike HBE and CE, EP is not as concerned with human diversity, instead aiming to elucidate the psychological processes that cause behaviour. EP has been interested in the causes of violence against women and tends to focus on the adaptive problems that humans may have been exposed to throughout evolutionary history, such as being cuckolded, and how these relate to violence (Buss and Duntley, 2011; Daly and Wilson, 1988).

Importantly, the distinctions between the three schools of thought are not absolute and are converging somewhat as these fields mature. I now review the foundational evolutionary theory that is relevant to discussions of the evolution of patriarchy and behaviour more generally.

1.2.2 SEXUAL SELECTION AND SEXUAL CONFLICT

"The sight of a feather in a peacock's tail, whenever I gaze at it, makes me sick!"

Charles Darwin

Sexual selection

Sexual selection is a subdivision of natural selection that acts on an individual's ability to reproduce. Sexual selection favours traits that are specific to improving the chances of winning a competition

over a mate, increasing access to mates or increasing an individual's appeal as a prospective mate (Darwin, 1871). It constitutes an important evolutionary force that shapes diversity, even producing phenotypes that obfuscate or work against the force of natural selection – such as the peacock's tail.

Darwin originally thought that sexual selection would act more strongly on males than females because of the observed intensity of competition between males for access to females, which he used to explain why we tend to see higher investment in ornaments and weapons in males. This position was then consolidated via Bateman's principles. In a series of experiments on Drosophila, Bateman showed that the association between mating success and reproductive success is much stronger in males than females and therefore sexual selection on males will be stronger (Bateman, 1948). In human terms this is summarised by the hypothetical idea that a man could father as many children as women he could have sex with, whereas a woman has an upper limit due to biological constraints, resulting in men having a higher potential reproductive rate than women. Furthermore, given internal fertilisation, gestation, and lactation the minimum energetic cost of reproducing for a woman is much higher than the energetic cost a man pays for mating with her. The combination of these dynamics results in males competing over a limited number of females, while females choose which men they will partner with (Trivers, 1972). What might females be choosy about? Females can benefit from choosing a male with the best genes or the male who offers the most investment. Given the highly dependent nature of human children (Kaplan et al., 2000) it is assumed that women will desire relatively high investment from men, which can be resources, paternal care or anything that will aid female reproduction and child survival.

Despite a number of criticisms and caveats of Bateman's principles - legitimacy issues over the original data (Hoquet et al., 2020), subsequent failures to replicate the study (Gowaty et al., 2012), the effect of ecological variation, such as sex ratio, on the sex-biased strength of sexual selection (Kokko and Jennions, 2008), and evidence that females can also have positive Bateman gradients meaning that there is an association between mating success and reproductive success for females too (Fromonteil et al., 2023) (although see Kokko and Jennions (2023) for important qualifications on interpretation) - the basic logic still stands and males generally have steeper Bateman gradients than females (Janicke et al., 2016).

Sexual conflict

Sexual selection operates in parallel with sexual conflict, which arises from different fitness goals between sexes. When one sex (A) employs a 'tool' to influence the behaviour of the other sex (B) at B's expense but for A's benefit, sexual conflict emerges. In humans, we frequently observe this conflict in contexts like multiple mating and childcare decisions. For instance, a woman may resist her husband's intention to take a second wife, as this would divide his attention and resources, negatively impacting the first wife. However, preventing this would impose a fitness cost on the husband, who loses the opportunity to enhance his reproductive success through a second wife, leading to an evolutionary conflict of interest between the sexes. Conflict arises over female multiple

mating as men risk being cuckolded, and unwittingly investing in offspring that is not biologically theirs – called paternity uncertainty. Such sexual conflicts can spark an evolutionary arms race, with each sex developing adaptations to gain an advantage over the other.

Humans exhibit various behavioural 'tools' employed by both men and women to influence each other's behaviour. Male sexual proprietariness, characterized as resentment towards infidelity or women's attempts to leave marriages, and male sexual jealousy as one of the emotional outputs of proprietariness, exemplifies male adaptations to female promiscuity and paternity uncertainty (Wilson and Daly, 1996). Another male tool is sexual coercion, involving the use of force or threat to increase mating opportunities or prevent rivals from accessing mating opportunities, at the expense of the female (Smuts and Smuts, 1993). Coercion can manifest through intimidation, harassment, and mate guarding to limit females from mating with others or preventing them from leaving a partnership (Muller and Wrangham, 2009). Paternity uncertainty matters less when men invest less in their offspring, as being cuckolded becomes less costly, reducing sexual conflict over this particular dimension, as evidenced by a positive association between paternal investment and the severity of jealous responses (Scelza et al., 2020).

Patriarchy can be understood, in part, as a product of these conflicting sexual strategies, leading to elaborated behavioural adaptations in human societies (Smuts, 1995), such as the complex webs of cultural norms, religious beliefs, legal structures, and social customs that dictate and restrict female sexuality and freedom, often benefiting men. Norms that place a premium on female virginity and practises like veiling and seclusion constrain female sexual behaviour and confine women to the home, curtailing their social and economic opportunities but with an ultimate fitness benefit for men. Violence against women can also be viewed as a coercive 'tool' that confers evolutionary benefits for men. However, sexual selection and conflict is by no means the only evolutionary driver of patriarchy and women are oppressed by individuals beyond their sexual partners, such as their family. To explain the full spectrum of patriarchy, one must also turn to the theories of inclusive fitness and parent-offspring conflict to understand when individuals cooperate or when they may be in conflict.

1.2.3 INCLUSIVE FITNESS

Over fifty years ago, W.D. Hamilton proposed that comprehending the evolution of altruism, or any trait, requires considering the average fitness (survival and reproduction) of all individuals bearing that trait (Hamilton, 1964a, 1964b, 1963). In interactions between individuals, Hamilton's rule broadly states that a behaviour will become more prevalent when $rb - c > 0$, where -c represents the average effect of the behaviour on the actor's fitness (commonly termed costs), b is the average effect on the fitness of the recipient(s), and r denotes the relatedness between the actor and recipients. Since many cases of altruism and cooperation occur between kin, John Maynard Smith coined the term 'kin selection' to describe natural selection among genetically related individuals (Maynard Smith, 1964). Kin selection operates through selection on behaviours that favour the survival and

reproduction of kin, even if it entails costs for the individual. Kin selection theory (or inclusive fitness theory) predicts the evolution of behaviours maximizing the actor's inclusive fitness when Hamilton's rule holds. Inclusive fitness theory can be used to explain cooperative behaviour as well as conflict among kin (West et al., 2002).

Inclusive fitness is composed of direct fitness and indirect fitness. Direct fitness reflects the impact of social behaviours on the actor's own reproductive success (helping oneself), and indirect fitness reveals the effect of social behaviours on the reproductive success of kin (helping one's kin), weighted by the relatedness between the actor and the recipient (West et al., 2007). It is the currency that human behavioural ecologists assume that individuals are attempting to maximise. As such, it is an indispensable aspect of understanding the evolutionary basis of almost any human behaviour, including patriarchy. Of particular importance to understanding cooperation and conflict is how many surrounding kin there are. If dispersal is low, i.e. when populations are known as viscous, then it is possible that individuals are all quite closely related and cooperation between neighbours may be easy to evolve (Hamilton, 1972, 1964b). Kin may cooperate to enhance the resources around them, for example working in families or extended families. However, this inevitably sets up conflict, as numerous individuals may be living off the same resources (such as a farm, herd, or territory). In this way, cooperation and conflict are two sides of the same coin.

Of particular importance to societal gender dynamics and cooperation or conflict between men and women is post-marital residence, since this alters the kinship dynamics of a group and the average relatedness of each sex to the group. Patrilocal societies, where the post-marital residence is with the husbands' family and women move away from their natal home, are more common than matrilocal societies, where men move to their wife's homes (Murdock, 1967). In the former, men will be surrounded by more kin, whereas in the latter it will be women. Given inclusive fitness dynamics one would predict that the individual that is more related to the group will receive more altruism and it is generally assumed that being surrounded by kin is beneficial. Dispersal also affects with whom you are competing in the group and thus whether an ego behaving altruistically, reducing their own competitiveness, in turn, increases the competitiveness of unrelated group members or related ones.

Although limited dispersal increases relatedness between interacting individuals and thus promotes altruism, it may also increase relatedness between potential competitors, which opposes altruism. Grafen (1984) first incorporated the effect of kin competition on kin selection into Hamilton's rule, developing an inequality that takes into account all individuals whose fitness is affected by an altruistic act. Grafen argues that as the altruist becomes more related to the beneficiary's competitors and/or the altruistic act increases the general level of competition, the kin selection advantage of being altruistic is reduced. Many theoretical studies based on Grafen's model and idea have proven that the benefits of increased relatedness that arise as a result of limited dispersal are exactly cancelled by the cost of increased competition between relatives (Platt and Bever, 2009; Taylor, 1992a, 1992b).

Kin selection has been used to explain why in Old World Monkeys, where females remain in their natal group, females tend to be the more cooperative sex and behave nepotistically towards their female relatives (Silk, 2002). By contrast, in chimpanzees, males are the philopatric sex and exhibit unique cooperative behaviours such as group territory defence, coalitionary aggression and sharing meat, although there is mixed evidence that cooperation is titrated within chimpanzee groups based on relatedness (Langergraber et al., 2007; Morin et al., 1994). In humans, kinship dynamics have been implicated in the evolution of a wide range of unique human characteristics from the menopause (Cant and Johnstone, 2008) to warfare (Choi and Bowles, 2007; Dyble, 2021; Micheletti et al., 2018) to the relative sex egalitarianism of hunter-gatherers (Dyble et al., 2015) to religious celibacy (Micheletti et al., 2022b; Zhou et al., 2022) to sex-bias in workloads (Chen et al., 2023). Similarly, evidence from mathematical modelling indicates that the scale of competition and the strength of the bias in post-marital residence can have strong effects on whether men or women receive more altruism. Areas with a strong female bias in dispersal, and high levels of competition, such as through warfare, can lead to 'boys clubs' where men receive more altruism from both other men and unrelated women (Micheletti et al., 2020).

1.2.4 PARENT-OFFSPRING CONFLICT & SEX-BIASED INVESTMENT

Parent-offspring conflict, analogous to sexual conflict, arises due to diverging fitness interests between parents and their offspring (Trivers, 1974) and is also instrumental in the emergence of patriarchy due to sex-biased investment by parents. Parents make resource allocation decisions that generate conflict; whether to invest in offspring or themselves, how many offspring to have, and how to allocate resources between offspring (Hill and Kaplan, 1999). Each child would prefer to have the most investment, thus generating both parent-offspring conflict and sibling-sibling conflict. All being equal, parents should invest equally into sons and daughters as if one sex becomes rare then greater production of that sex should be favoured by natural selection as it will, on average, out-reproduce the more common sex (Fisher, 1930). However, if the costs and benefits of raising sons compared to daughters differ, then parents can increase their inclusive fitness by preferentially investing in the sex that is either cheaper to raise and/or more likely to reproduce at a higher rate, leading to sex-biased investment. Local resource competition (LRC) (Charnov, 1982; Mari et al., 2008, 2008) and local resource enhancement (LRE) (Emlen et al., 1986) are two alternative hypotheses explaining how patterns of cooperation and competition between siblings influence sex-biased costs and benefits, and in turn influence sex allocation of parents. LRC occurs when one sex disperses, and the non-dispersing sex will compete with parents for resources and be more costly to produce. LRE occurs when one sex is more helpful than another sex and will be less costly to produce. LRC and LRE will lead to a sex ratio bias towards the less costly sex and can also explain post-natal investment by parents.

Parental condition may also affect sex-biased investment. The Trivers-Willard hypothesis posits that where parental condition differentially affects the reproductive success of different sex offspring then parents should titrate investment into the sex that has greater fitness returns (Trivers and Willard, 1973). This is clear amongst polygynously mating animals where male reproductive success is determined by their social rank or physical strength. In these species, if the parent is in good condition, then the fitness-maximising behaviour would be to invest in a son, as he is likely to go on to mate with many females. By contrast, if the parent is of low quality, then it pays to invest in a daughter as she will still reproduce, even if low status. Evidence has been found in red deer (Clutton-Brock et al., 1984) and feral horses (Cameron and Linklater, 2007) where mothers in poor condition tend to give birth to daughters and those in good condition give birth to sons. In humans, while there is some evidence for sex ratio biasing at birth (Cameron and Dalerum, 2009), the logic can also be applied to post-natal care, although the conditions under which a poor-quality mother with offspring of both sexes should invest more in a daughter over a son are more restrictive (Veller et al., 2016). In humans, sex-biased investment is most obvious with wealth inheritance, with sons predominantly receiving most parental wealth. In the Ethnographic Atlas, a cross-cultural database of 1267 cultures (Murdock, 1967), not one has preferential wealth inheritance by daughters.

Polygyny and bride price

Polygyny, where a man has multiple wives, is common historically, with 80% of the 186 societies in the Standard Cross-Cultural Sample permitting it (Murdock and White, 1969) and tends to be strongly associated with wealth inheritance by males and bride price (a wealth transfer from the groom's family to the bride's family). This is because, as soon as there is wealth able to be inherited, such as livestock, men will try to monopolise it to attract more wives, often termed resource-defence polygyny. Women are predicted to become the second (or third or fourth) wife of a man so long as she still receives the same or more resources than she would were she to marry an unmarried man – called the polygyny threshold model (Orians, 1969). Wealth associates with number of wives, in line with this prediction (Borgerhoff Mulder, 1990; Lawson et al., 2015), although there are instances where female fitness appears to be affected detrimentally by polygyny, in which case male coercion or female-female competition between co-wives may be responsible (Strassmann, 1997).

If men mate polygynously, variance in the reproductive rate of men results, with some having many wives and children, whilst others, who have little or no wealth, remain unmarried and childless. Consequently, men also have a higher potential reproductive rate than women. In these instances, the fitness-maximising behaviour for parents is to invest more wealth in sons who can use it to acquire multiple wives, increasing the number of grandchildren a parent has. Females are a limited resource, increasing male-male competition for wives, resulting in parents of daughters exploiting this by demanding a bride price, evidenced by a strong association between polygyny and bride price (Hartung, 1982). Competition may also increase between men within the family if sons depend on fathers to pay their bride price. Fathers decide whether to use their wealth to secure another wife for

themselves or for their sons, and which son to invest in. In line with these predictions, amongst the Gabbra pastoralists and Kipsigis of Kenya, reproductive success is higher among richer households who pass wealth onto sons, and lower among men who have several older brothers (Borgerhoff Mulder, 1998; Mace, 1996). Further evidence from Ethiopia indicates that heritable wealth increases the level of competition between brothers, with older brothers marrying earlier and receiving larger bride price payments (Gibson and Gurmu, 2011). Evidence also strongly suggests that where societies acquire cattle, having previously practised horticulture, they adapt their systems in line with fitness maximisation predictions, and move from matrilineal to patrilineal inheritance (Holden and Mace, 2003).

Monogamy and dowry

Whilst most societies have permitted polygyny, many men still marry monogamously, which tends to be the case for hunter-gatherer populations where there is a lack of monopolisable wealth, preventing men from being able to support multiple wives, sometimes called ecologically imposed monogamy. In these instances, it is better to partner with an unmarried man rather than become a second wife and compete with co-wives and their children. Resource constraints can even lead to polyandry where multiple men (often brothers) partner with one woman. This tends to occur when additional resources are needed to support a woman and her children, such as in harsh environments like Inuit communities in the Arctic and some regions of Tibet (Crook and Crook, 1988; Smith, 1998; Starkweather and Hames, 2012). Evidence in Tibet indicates that when these resource constraints are alleviated through wage labour opportunities, younger brothers will set up their own families and leave polyandrous marriages (Haddix, 2001).

However, many agricultural societies also predominantly practise monogamy despite being resource rich. Whilst monogamy makes sense from a female perspective, as she doesn't have to share her husband's resources with co-wives, it makes less sense from a male perspective, if they could afford multiple wives. One explanation is that females trade their sexual fidelity for exclusive access to male wealth that benefits men through decreased paternity uncertainty (Fortunato, 2015). Monogamy may also be beneficial when dividing inheritance between multiple heirs reduces the value of wealth; often true of large landholdings that benefit from economies of scale. Unigeniture – where one son inherits, is common amongst intensive agricultural societies such as the landed elite of Europe as this allows families to prevent their wealth from being broken up. Mathematical modelling supports this view of monogamy as the strategic choice of both males and females, where men benefit from high paternity certainty and females from their children being the sole beneficiaries of inheritance, but only under environments where wealth dilutes in value if split (Fortunato and Archetti, 2010).

Whilst under polygyny males compete amongst themselves for a limited number of wives, now under monogamy, women compete for access to the richest husband. In order to make women more competitive on the marriage market, parents invest in dowries for their daughters - termed the female competition model, which finds that dowry is more common in stratified societies (Gaulin and

Boster, 1990). Whilst at first, this seems beneficial for women, as they inherit wealth, it also makes daughters costly. If wealth is consolidated in the hands of very few men competition can be fierce and dowry inflation can result, leading to sex-biased infanticide as daughters become too expensive (Gulesci et al., 2018; Shenk, 2007). This competition is also evident in the fact that dowries tend to make up a much larger proportion of household income than do bride prices, often up to several times the annual income (Anderson, 2007). Similarly, the average dowry increases with socioeconomic status as rich families compete to maintain their status (Guzzetti, 2002). In India, dowry inflation and competition on the marriage market have been so high that it has led to the emergence of dowry deaths, where the groom's family attempts to extort the bride's family for more money, leading to the eventual murder of the bride (Vicente et al., 2020).

However, it is certainly not the case that bride price and dowry are mutually exclusive, nor that they only exist in polygynous or monogamous societies, respectively. For example, the Arsi Oromo of Ethiopia are polygynous and have both dowry and bride price, although the bride price tends to be significantly higher in value (Uggla et al., 2018). Furthermore, the cost of dowry and bride price may associate independently with other cultural changes. For example, decreases in the number of girls undergoing female genital cutting in the Arsi Oromo has led to an increase in the cost of dowry for uncut girls, as parents substitute the lack of cutting with a higher dowry, but no change in the cost of bride price (Gibson et al., 2023).

This cost of daughters can be further accentuated if females are also less able to contribute to family wealth, such as when agriculture is based around heavy machinery like the plough (Alesina et al., 2013; Boserup, 2013). Furthermore, monogamy creates a virginity premium as a way of signalling paternity certainty that leads to the elaborate controls on female freedom we see across the world, such as female claustration. This can create further pressure to remove women from the workforce if it requires them to leave the home or interact with unrelated men. Under more traditional economies, where much work could still be done at home, this may not have significantly increased the cost of daughters, but under more advanced economies, where wealth tends to be generated from wage labour outside the home, this becomes a bigger issue.

Parental control over marriage

Given that marriages often involve transfers of wealth, such as dowry and bride price, parent-offspring conflict commonly arises over the choice of partner, with humans being unique in the animal kingdom in the ability of parents to control or influence the mating of their children. Parental control over marriage appears to be an ancestral state (Walker et al., 2011), was found in 96% of hunter-gatherer groups sampled (Apostolou, 2007), and becomes more common in agropastoral societies where wealth transfers become more significant (Apostolou, 2010). Humans have produced many ways of ensuring that offspring mate choice is limited. For example, child marriage or betrothal; proscriptions on pre-marital sex; social segregation of the sexes; and normatively restricting the pool of eligible mates to a predefined group, such as patrilateral parallel marriages – all of which hinder

the ability of offspring to form their own romantic attachments (Apostolou, 2007; Chagnon et al., 2017; Sharma, 2016; Talbani and Hasanali, 2000).

Parents are predicted to prioritise qualities that benefit the wider family, such as resources, status, and in-group cooperation, while children prioritise their own self-interest, and are hypothesised to seek characteristics associated with genetic quality, such as good looks and physical strength (Apostolou, 2008; Buunk et al., 2008; Perilloux et al., 2011; Rosenblatt and Cozby, 1972). However, despite potential divergences, there is often a general alignment between parents and offspring on broad groups of beneficial traits, such as wealth, and parent-offspring conflict can sometimes be overstated (Agey et al., 2023). Additionally, depending on the specific cultural environment, parents may be able to arrange a better marriage than offspring would by virtue of their superior wealth and status.

Given that females are the limiting sex and valuable reproductive resource, parental control over mating is typically stronger for daughters (Mace, 2018), this may produce an alignment of interest between parents and husbands leading to joint policing of the sexual behaviour of a woman. Parents wish to marry daughters young to avoid them forming the 'wrong' romantic attachments, which aligns with husbands' desire for virginity, reducing paternity uncertainty. In many instances discovery that a girl is not a virgin can be grounds for a divorce (Khan, 2006) and this may mean her family have to return the bride price (Lowes and Nunn, 2018). Parent-offspring conflict may also explain why mothers, who were subject to sexual suppression themselves, continue to control their daughters, as it is in their interest as a parent to prioritise what is best for kin. For example, mothers are more supportive of veiling when they have more sons and therefore will benefit more from the sexual suppression of women (Blake et al., 2018). Similarly, veiling is more common in harsher environments where paternal care is important and therefore paternity certainty is more essential (Pazhoohi and Kingstone, 2020).

Matrilineal descent

Matrilineal and matrilocal societies tend to arise where there is less wealth to physically compete over, such as in horticultural societies. In Africa, the existence of a 'matrilineal belt' has been explained by the presence of the tsetse fly that makes it difficult to keep cattle (Holden and Mace, 2003). Similarly, there have been many more societal transitions away from matriliny than there have been to matriliny, and the correlates of these tend to relate to economic and subsistence transitions towards pastoralism, intensive agriculture or a market economy, all of which result in property becoming male controlled (Shenk et al., 2019). Interestingly, in China, state communist intervention, which reduced wealth inequality, the ability to marry polygynously, and increased female contribution to household wealth, may be driving the discrepancy between stated son preference and actual daughter-biased investment (Du and Mace, 2018).

In other areas, matriliny has been associated with societies reliant on fishing due to the strong division of labour and prolonged male absences leading to low paternity certainty and female control of land

(BenYishay et al., 2017). Matriliny may also be driven by the extent to which related females raise children communally. Among the Mosuo of China, neither sex disperses, and siblings live together in female-headed households and practise walking marriage, where men visit their partners at night and then return to their household in the morning. Because women raise their children together any investment a man makes in his own biological children would also be shared with unrelated children, which alters the inclusive fitness payoffs in favour of men investing in the children of their sisters (He et al., 2022; Wu et al., 2013). In these rare duolocal kinship systems, where the natal family lives together for their whole life, any investment a mother makes in a daughter can lead to competition with other co-resident daughters. Therefore mothers are predicted to favour sons, who reproduce outside the family unit and therefore are not in such competition with coresident family members (Johnstone and Cant, 2010). Evidence for this son-biased investment has been found in resident killer whales, which have a similar 'duolocal' social structure where individuals live in their matrilineal family group for life. This maternal bias in investment may explain why males in duolocal systems are allowed to live at home without making as much of a contribution to household labour as their sisters (Chen et al., 2023; Wu et al., 2013).

Although it is contested whether paternity uncertainty is a cause or a consequence of matriliny it does tend to be lower in matrilineal societies leading to the weakening of marriage bonds and a more permissive sexual culture. Men tend to be less concerned with paternity where wealth is passed through women, with evidence that male sexual jealousy varies cross-culturally in line with the level of parental investment (Scelza et al., 2020). Whilst it appears that matriarchal cultures exist where men contribute less to raising children, this is compensated for by the support women get from their surrounding kin. Women in matrilineal societies are also less likely to justify or experience domestic violence, have greater decision-making power within households, and experience less stress (Anderson, 2021; Lowes, 2022; Reynolds et al., 2020).

1.2.5 THE EVOLUTION OF PUNISHMENT

Humans are also unique in our ability to cooperate and punish non-co-operators, even in large groups and with unrelated individuals (Henrich et al., 2006). The evolutionary origins of punishment pose challenges, as punishers are often assumed to bear a cost, making them vulnerable to invasion by defectors and second-order free-riders (co-operators who do not punish defectors) (Boyd and Richerson, 1992). Mathematical models point to crucial dynamics influencing the emergence of punishment, including group size, the cost of punishment, repeated interactions, high strength of ties, low between-group mobility, and punisher reputation (Boyd et al., 2003; Boyd and Richerson, 1992, 1988b; Hilbe and Traulsen, 2012; Roos et al., 2014). Many of these dynamics rely on the ability of co-operators and punishers to cluster (Nowak et al., 2010), as once clustered they have higher payoffs than the defectors trying to invade. Gardner and West similarly find punishment increases if it is associated with cooperation received, and while this may be produced by kin interacting, it is not dependent on it (Gardner and West, 2004). Punisher reputation is one way that punishment and

cooperation can associate in the absence of high relatedness (Hilbe and Traulsen, 2012; Roos et al., 2014).

The cost of punishing diminishes as defectors become rare, since punishment becomes less frequent (Boyd et al., 2003). This allows altruistic punishment to evolve through group selection, but migration rate, mistaken defection and costs to punishers must all be low. By contrast, third-party punishment has been shown to be evolutionarily stable without group selection in environments of high strength of ties and low mobility (Roos et al., 2014).

In various models third party punishment evolves due to individual benefits for the punisher and fits within an understanding of punishment as social investment, whereby punishing is immediately costly but ultimately provides benefits through the induction of more cooperative strategies (Gardner and West, 2004; Hilbe and Traulsen, 2012; Roos et al., 2014). Once punishment becomes prevalent, it is highly stable if the cost of cooperation is lower than the cost of being punished (Gardner and West, 2004). Indeed, Boyd and Richerson (1992) go as far to say that if you have 'moralistic' individuals who punish co-operators that do not punish, and the cost of being punished is greater than the cost of punishment, then this strategy is extremely difficult to invade, and can be a recipe to stabilise almost any behaviour, however arbitrary.

In many ways, patriarchy contains punishment. Violence against women is often punishment for sexual transgressions, and policing of behaviour, such as chaperoning, is also an extension of punishment that prevents the actual transgression taking place. The relevance of the environments in which punishment becomes stable will be elaborated on in Chapter 2. We now turn to a brief discussion of the types of violence against women that will be discussed in this thesis.

1.3 VIOLENCE AGAINST WOMEN

Eliminating all forms of violence against women, which the UN defines as "any act of gender-based violence that results in, or is likely to result in, physical, sexual, or mental harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private life (United Nations, 1993)", is target 5.2 of the Sustainable Development Goals (SDG). While SDG 5.2 refers to *all* types of violence, the two indicators that make it up refer only to intimate partner and sexual violence. However, many women across the world also suffer from honour-based violence, which is relatively understudied by comparison, and tends to be distinct in terms of its perpetrators.

This section will define the types of violence against women, give brief overviews of how evolutionary theory conceptualises them, and describe what we know about their risk factors. A large part of this section will focus on honour-based violence for which empirical work and evolutionary theorising are relatively lacking, and to which this thesis makes a significant contribution.

1.3.1 *Intimate partner violence*

Intimate partner violence (IPV) is defined as "any behaviour within an intimate relationship that causes physical, psychological or sexual harm to those in the relationship (WHO, 2021a)" and is generally considered the most common type of violence against women. It is primarily perpetrated by boyfriends and husbands, exhibiting considerable cross-country variation with estimates ranging from 10-50% of ever-married women aged 15-49 reporting physical or sexual IPV (WHO, 2021b).

Sexual selection and sexual conflict make certain predictions about IPV. One view suggests that IPV may be an adaptation to deter female infidelity or prevent women from leaving a relationship, serving as a way of mate-guarding to ensure exclusive access to a woman. In line with this, IPV often arises from feelings of jealousy or suspicions of infidelity, diminishing with age as females become less fertile or reach menopause (Kaighobadi et al., 2008; Wilson et al., 1995; Wilson and Daly, 1996). Cues signalling a potential relationship departure, like changes in mate quality, may also trigger IPV, such as if he becomes unemployed or she becomes more desirable on the mating market (Buss and Duntley, 2011). Research also indicates that IPV can be used to control female sexual jealousy, which facilitates male adulterous behaviour, and also to increase sexual access to a partner, with clear benefits in terms of reproduction (Stieglitz et al., 2018, 2012).

The prevalence of IPV is heavily influenced by ecological and cultural contexts, particularly the costs and benefits associated with the behaviour. Paternal investment significantly affects the likelihood of IPV due to its impact on the cost of being cuckolded (Scelza et al., 2020). Social acceptance of IPV, which varies cross-culturally, also plays a role (Vandello and Cohen, 2003). Societies with strong stigmas against IPV or robust policing systems tend to exhibit lower rates of such violence. Moreover, women's ability to employ counterstrategies, such as accessing institutional protections like the police or women's refuges, can mitigate IPV. Other aspects of the environment that can protect women against violence include the presence of related kin who can come to her defence (see Chapter 4), as is the case in matrilocal populations (Smuts, 1992), and having economic independence and non-kin friend networks that can result from labour force participation (Anderson, 2021; Ross, 2008). Conversely, wealth exchanges at marriage, such as bride price, may limit female resistance to violence as it affects families' ability to protect their daughters in cases of abuse, as marriage is seen as a transfer of property (Abramsky et al., 2011; Eves, 2019). Where women have little opportunity to resist violence, IPV can become a very low-cost behaviour for men.

1.3.2 *Sexual violence*

Sexual violence is defined as "any sexual act, attempt to obtain a sexual act, or other act directed against a person's sexuality using coercion, by any person regardless of their relationship to the victim, in any setting (WHO, 2021a)". Perpetrators can range from intimate partners to acquaintances to

strangers. Global estimates indicate that at least 6% of women aged 15-49 have experienced non-partner sexual violence at least once in their lives (WHO, 2021b). However, sexual violence remains one of the most stigmatising forms of violence and is likely to be severely underreported and cross-cultural variation in current data likely reflects variation in reporting rather than real differences. This thesis mainly focuses on non-partner perpetrated rape.

Rape, or forced copulation, is observed across the animal kingdom, suggesting it predates our species as a functional trait (Clutton-Brock and Parker, 1995). Unlike the predominant feminist view, that rape is about power and not about sexual desire, evolutionary theorists tend to believe there is a sexual motivation (Vandermassen, 2011). However, sex and power are not mutually exclusive. Occasions of forced sex will likely be accompanied with feelings of hostility and a desire to dominate the other person, and this is entirely compatible with an underlying or 'ultimate' sexual motivation. There are also instances where the motivation for rape appears to relate more to a power motivation than a sexual one, such as in wartime, where it is used as a weapon to humiliate the opposing side (Kirby, 2013).

By and large, rape is seen to be an evolved but context-dependent behaviour whereby men may rape if the behaviour is low-cost or because they are unable to find sexual partners any other way (although this is not reflected in data showing that rapists tend to be more sexually active, nor are they necessarily low-status) (Hagen, 1979; Lalumière et al., 2005; Shields and Shields, 1983). One ecological factor hypothesised to affect the rate of rape is the sex ratio, however, it is unclear in which direction the association should go. Some argue, based on parental investment theory, that a male-biased sex ratio will increase competition amongst men for scarce females (Emlen and Oring, 1977) leading to increased aggression and rape (see Chapter 6). However, hypotheses based on mating market theory argue that when females are scarce, they will have higher bargaining power and make increased demands on males, such as more investment, leading to increased pair bonding and paternal investment and lower levels of violence. Empirical work has found associations consistent with parental investment theory (Diamond-Smith and Rudolph, 2018), mating market theory (Pollet and Nettle, 2008), and both (Pabst et al., 2022a).

1.3.3 HONOUR-BASED VIOLENCE

Honour-based violence or abuse is less clearly defined, partly because of receiving a relative lack of attention compared to the other forms of violence against women. In the UK it has no statutory definition but is commonly defined as "a crime or incidence which has or may have been, committed to protect or defend the honour of the family and/or community (Metropolitan Police, 2023)". As such, it is often more useful to discuss honour as a social norm and how violence manifests as a result.

Honour can broadly be seen as a "social process that determines and designates social value to an individual or subgroup (Gill, 2017)". Honour is closely related to status and reputation; and usually refers to an individual's ability to control others or "command deferential treatment" (Vandello and Cohen, 2003). An honour culture is defined as a culture where a person (usually a man) feels obliged to respond to affronts to their reputation with violence (Cohen, 2007). Cultures of honour exist around the world and include parts of the Middle East, Central and South Asia, the southern United States, inner-city gangs, and some South American countries. They vary in many ways, some stress female virginity to an extreme degree, others machismo, while others have intensely strong norms for hospitality towards strangers. What they have in common is the importance placed on responding to insults and dishonour with violence, or at least the threat of violence.

Whilst there is a broad psychological literature that focuses on male-on-male honour-based violence (see Cohen, 2007) this thesis focuses on the type of honour culture that has emerged predominantly in the Greater Middle East (Figure 1-1), a vaguely defined area of the world including North Africa, The Middle East and parts of Central Asia (Perthes, 2004), sometimes termed the patriarchal belt (Kandiyoti, 1988), and where the victims of HBV are principally women.

Figure 1-1: Map of the Greater Middle East (Based on Perth (2004))

In the societies of the Greater Middle East there are many different types of honour, some of which can only be applied to men, others only to women, and yet others that are gender neutral. For example in Turkey, the concept of *seref* refers to the honour that men derive from their own achievements or from their male relatives' achievements (Sev'er and Yurdakul, 2016). By contrast *izzet* is gender neutral and refers to the honour that is gained from behaving generously. Similarly in the Awlad-Ali Bedouins of Egypt *sharaf* refers to a broad set of honour related values such as generosity and loyalty, '*agl* to the value of self-control, and *hasham* to the value of modesty – often associated with femininity (Abu-Lughod, 2016).

The type of honour that this thesis is concerned with is that related to female sexual behaviour and fidelity. In the case of Turkey and Iran this form of honour is referred to as *namus* which is maintained within women but affects men (Fischer, 1980; Sev'er and Yurdakul, 2016). The ability of men to command respect in the community depends strongly on the conduct of their female kin, particularly in relation to sexual conduct. In the words of a man from Panjgur in Pakistan: "a woman's shame is the shame of her husband and kin; her honour is their honour (Pastner, 1972)". Since a man's *namus* is affected by the behaviour of his female kin the protection of *namus* cannot be fully entrusted to women. Cultural norms and forms of coercion thus exist to police and ensure the correct behaviour of women, many of which come under the umbrella of honour-related violence which is broadly considered to include: limiting female movement; male chaperones; gender segregation; female seclusion; emotional violence; physical violence; and honour killings, where a woman is murdered in response to an accusation of sexual impropriety – the most extreme extension of aggression in response to dishonour (Gill et al., 2014).

The practise of purdah is a classic example of an honour-related cultural trait. It is common to several Muslim countries including Afghanistan, Pakistan, and Saudi Arabia, as well as Hindu communities, particularly in the North of India. Purdah is a means by which women are prevented from dishonouring the family through their veiling and seclusion from non-kin and strangers. Purdah was often incompatible with certain forms of agriculture where women make a large contribution, as this required them to be outside and in the presence of unrelated men (Khan, 2006; Pastner, 1972). For this reason, it is thought that historically, purdah was limited to the wealthier elite classes who could afford to seclude their women. More recently, as other families became wealthier or due to the imitation of the elites, the practise of purdah has spread beyond the upper classes. For example, in Panjgur, Pakistan, it is stated that originally only the aristocratic Hakim class practised full purdah (total seclusion and veiling), while by the 1970s the smaller landowning Baluch class and even the non-landowning Hizmatkar practised full purdah (Pastner, 1972). Additionally, the degree to which women are subject to honour-related controls varies a lot between honour cultures. For example, to take one of the most visible cultural traits of veiling, the blue coloured burqa common in Afghanistan results in the complete covering of a woman including her eyes behind a lacelike fabric, whereas amongst the Awlad-Ali Bedouins the full face is visible.

Honour killings

The victims of honour killings are almost always women and are typically young (D'Lima et al., 2020; Gill et al., 2014; Kressel et al., 1981; Kulczycki and Windle, 2011; Nasrullah et al., 2009; Sev'er and Yurdakul, 2016). Motivations to commit an honour killing include: marrying outside the preferred group (e.g. family, tribe or caste), marrying without family consent, pre-marital relationships, adultery, being seen with a man who is not a relative, being filmed dancing, and even behaving in a 'modern' or 'western' manner (D'Lima et al., 2020; Gill, 2017; Khan, 2006; Nasrullah et al., 2009; Sev'er and Yurdakul, 2016). Male honour-related violence in response to sexual behaviour does occur, for

example if a man discloses he is gay (Khan and Lowe, 2019), or if he is killed alongside the dishonourable woman (Kressel et al., 1981). The perpetrators are mostly male and are usually the victim's male agnates, often her brother, father or uncles (D'Lima et al., 2020; Khan, 2006; Kressel et al., 1981; Kulczycki and Windle, 2011; Kulwicki, 2002). Often the youngest brother may commit the crime, as he will receive the shortest sentence (Önal, 2008). Husbands are also perpetrators and a study of honour killings in Pakistan found them to be the majority perpetrators, often motivated by accusations of extramarital affairs (Nasrullah et al., 2009). Interestingly, an older analysis of honour killings in Israel found that where a husband had attacked his wife he was her male agnate (Kressel et al., 1981). Female relatives are not innocent of the crimes and are often involved in conspiracy to murder and can be active agents during the family decision-making process.

Murders are mostly thought to be premeditated, following a family meeting whereby the relatives of the girl decide what course of action to take (Sev'er and Yurdakul, 2016). Often, they are responding to ostracism and gossip from the community, which will only end once honour is redeemed through an honour killing. In Pashtun areas of Pakistan and Afghanistan a jirga, a group of local male leaders, may be the one to condemn the girl or woman to death following a meeting (D'Lima et al., 2020). Historically, honour killings were often also committed in public so that the community could observe the restoration of honour. Nowadays as they are illegal in most places, they are committed clandestinely, although in certain instances perpetrators hand themselves into the police (Önal, 2008).

Sev'er and Yurdakul (2016) detail over ten cases of honour killings from Turkey in response to a variety of 'provocations' including going to the cinema, having a baby out of wedlock, and alleged adultery. In the majority of cases the women are young and are murdered by their male family members. For example:

> *"Oruc Serin, aged 16, was shot to death by her brother in the market area of the rural town of Gaziantep…Just before her murder, Oruc had given birth out of wedlock and in a wheat field; she had buried the infant among the crop" – reported in Sev'er and Yurdakul (2016).*

Furthermore, in a survey of 63 cases of honour killings from Israel and Palestine motivations ranged from "holding hands with a shepherd boy in a field", to out of wedlock conception, to accusations of adultery, to being victims of rape (Kressel et al., 1981). This sample additionally demonstrates that men can also be attacked by the male kin of a seduced or dishonoured woman, with 16 men either having being murdered or having attempted to be murdered by the family of the dishonoured woman. Some women may also try and seek safety abroad, knowing that otherwise they will be killed. In one example from Pakistan, a girl moved abroad to escape her parents after marrying the man of her choice whose proposal had been rejected by her parents who had wanted her to instead marry her cousin (Khan, 2006).

Oftentimes, the village or community stand in solidarity with the perpetrator of honour killings. For example, in one case in Haryana, India, it was reported that the perpetrator was "accompanied by

applauding villagers to the police station to declare the murders" (D'Lima et al., 2020). In others, the policeman tasked with protecting a couple passed on their whereabouts to the *khap panchayat,* a council representing a number of villages, who then ordered their murders (D'Lima et al., 2020).

Whilst honour killings tend now to be reported mostly from the Greater Middle East, they have historically occurred in the wider Mediterranean region. One case, from Albania, involved a man talking and giving money to the young niece of the woman he was trying to court, so that she may pass it on to her aunt. As a result of her talking to him and taking his money her honour was tarnished, and she was murdered by her older brothers (Önal, 2008). Cases from Sicily show that husbands murdered their wives in the name of honour, often following accusations of adultery. On being asked to explain why one peasant replied "One kills because of honour…she (wife) will die, and he will be honoured forever! (quoted in Cottino, 1999)". Cases from Greece also indicate that male agnates murdered their female relatives in the name of honour, such as in the case of sex before marriage without having received a promise of future marriage (Safilios-Rothschild, 1969).

From an evolutionary perspective, to kill one's female relative, to whom you are 50% related (in the case of a father or brother) is an evolutionary puzzle, as you prevent her from having children to whom you would be on average 25% related. Little has been said by evolutionary theorists as to the potential function of an honour culture or honour killing, although see (Nowak et al., 2016) as to environments in which it might be selected. However, parent-offspring conflict is common amongst humans (see section 1.2.4), and infanticide by parents is well documented among hunter-gatherers and industrialised populations (Hermann, 2017; Hrdy, 2009). Additionally, inclusive fitness theory induces us to consider benefits to other offspring and wider kin which may outweigh the costliness of the behaviour (see section 1.2.2). Indeed recent theory and research in kinship dynamics, whilst highlighting the complexity of calculating Hamilton's rule across kinship networks, does demonstrate that seemingly harmful behaviours can evolve as a result of competition and benefits to the wider kin (Cant and Johnstone, 2008; Croft et al., 2021; Micheletti et al., 2022b).

Lastly, the religious and cultural histories of honour cultures in this area are intricate and there is, naturally, diversity in their emergent characteristics. However, the aim is not to digress deeply into this complexity. Instead, the aim is to highlight the broad trends and characteristics of honour cultures that *can* be isolated and attempt to draw some conclusions as to the emergence of honour cultures cross-culturally. I will also add here that whilst the public tends to see honour cultures, and honour-based violence against women, as a Muslim phenomenon, codes of honour existed long before the advent of Islam and honour-based violence was previously common in the now Christianised Mediterranean region (Khan, 2006; Tillion, 1983).

1.4 Overview of Thesis

In this thesis, I explore the behavioural ecological reasons for violence against women, with a particular focus on honour-based violence. No formal evolutionary models of honour-based violence

to date have been developed and therefore we rely on verbal models, which can be unreliable. Particularly I will examine an anthropological hypothesis that cousin marriage may have been instrumental in the emergence of honour-based violence against women, which will be discussed in Chapter 2. Throughout this thesis, I also compare honour-based violence to intimate-partner and sexual violence.

The thesis is structured as follows. In Chapter 2 I lay out the verbal theory hypothesising a connection between cousin marriage and honour. Chapter 2 is chiefly concerned with exploring reasons why cousin marriage is favoured in some societies and at certain points in time and why this might relate to honour cultures. I focus on the Greater Middle East, where cousin marriage is common and honour-based violence is principally directed at women, and I draw on the work of human behavioural ecologists, anthropologists, historians, and sociologists to explore both proximate and ultimate explanations. Chapter 3 describes the data that will be used throughout the thesis. Chapters 4-7 are data analysis chapters which test, at varying levels of analysis, whether we find an association between cousin marriage and honour-based violence. Chapter 4 draws on inclusive fitness theory to examine whether being married to a cousin is protective or a risk factor for intimate-partner or honour-based violence, using data from Jordan. Chapter 5 combines genetic data with survey data from across the Middle East, North Africa and Central and South Asia to examine whether genetic signals of cousin marriage are associated with the strength of an honour culture cross-culturally. Chapter 6 uses a unique database of newspaper reports from Pakistan and the large variation in sex ratio across the country to examine whether violence against women is lower where women are rare. Chapter 7 uses the same dataset to examine whether areas of Pakistan with higher rates of cousin marriage are associated with more reports of honour killings. Chapter 8 concludes with an overview of the thesis' findings and the extent to which they are consistent with each other, as well as a discussion of the cultural evolution of honour, and future directions for research.

CHAPTER 2: COUSIN MARRIAGE & HONOUR

"Keeping the girls in the family for the boys in the family".

Germaine Tillion (1983)

This chapter will introduce the verbal theory behind the hypothesis that cousin marriage is instrumental in the emergence of honour cultures and honour-based violence first proposed by Germaine Tillion in 1983. I begin by reiterating four statements. Firstly, this thesis is focused on honour cultures that primarily manifest in the Greater Middle East (Figure 1-1) and does not discuss those honour cultures that have been described in the Southern United States, the Balkans, or Southern Europe. Secondly, honour killings typically follow an accusation of dishonourable behaviour often related to sexual transgressions such as premarital sex, being in the presence of a man who is not a relative, refusing to agree to an arranged marriage, or appearing 'Western' (Gill, 2017). Thirdly, agnatic kin are considered the classic perpetrators of honour-based violence against women, suggesting that conflict surrounding sexual conduct is intrafamilial (D'Lima et al., 2020; Kressel et al., 1981). Fourthly, honour killings represent the most extreme form of punishment within the honour system, yet there are myriad other ways that the behaviour of women (and men) is controlled before such extreme measures are taken, including general policing through gossip, chaperoning and claustration. This prompts the question: why do populations in this region administer such severe punishment for transgressions that occur universally across the world? To answer this, I focus on one central hypothesis: that honour cultures have evolved in this region to maintain a distinct social and kinship structure stemming from a specific form of endogamy.

Drawing parallels between historical developments in Western Europe and the Greater Middle East, Jack Goody (1983) and Germaine Tillion (1983) noted that while marriage to close kin was declining in Europe, it appeared to be going nowhere, or indeed being strengthened, in the Middle East and North Africa. Goody argued that a ban on cousin marriage by the Western Christian Church was responsible for the economic growth that subsequently happened in the region. By breaking up clan-based kin networks the ban led to the emergence of nuclear families and individualistic norms thought to be more conducive to economic development, evidenced by lower rates of nepotism and higher rates of economic development (Akbari et al., 2019; Bahrami-Rad et al., 2022; Schulz et al., 2019). By contrast, Tillion noted that honour cultures tended to practise a "particular endogamy"; a preferred form of cousin marriage between the children of two brothers – also termed patrilateral parallel (PP) cousin marriage or father's brother's daughter marriage (see Fig 2-1).

Whilst documenting that honour killings long predate the Islamic religion, Tillion made an important connection between the tribal system, the Qur'anic prescription of female inheritance, and honour-based violence (Tillion, 1983). When tribes are in conflict with one another, cousin marriage serves to consolidate the tribe against kin-based rivals and prevent inheritable wealth from leaving the group. This is particularly important since the Qur'an mandates that women inherit half of what their brothers receive. To safeguard against women marrying outside the tribe and taking their inheritance with them, parents arranged their marriages to cousins, often preferring the father's brother's son, thereby preserving inheritance within the patriline. Consequently, a woman's sexual behaviour becomes intricately tied to the tribe's honour and strictly regulated to ensure adherence to these marriage preferences. It is this hypothesis, that patrilateral parallel cousin marriage is associated with honour cultures, that this thesis chiefly examines.

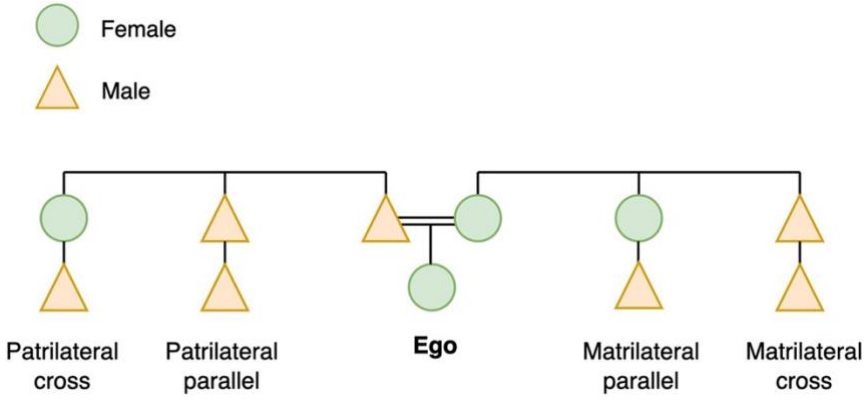


Figure 2-1: Types of cousins

The proceeding section will be structured in three parts: firstly, I will describe the hypothesised differences in outcomes between parallel and cross-cousin (CC) marriage (section 2.1); secondly, I will develop these ideas more deeply by evidencing the costs and benefits of parallel cousin marriage as it is represented in the ethnographic literature (section 2.2); thirdly, I will combine the insights from the ethnographic review with the evolutionary theory outlined in section 1.2 to advance a human behavioural ecological theory of cousin marriage and honour cultures (section 2.3).

2.1 Parallel vs. Cross-Cousin Marriage

Cousin marriage has been common cross-culturally, although today high rates of cousin marriage tend to be isolated to the Greater Middle East (Fig 2-2), where PP marriage is the preferred type (Bittles, 1994; Patai, 1955a). In contrast, CC marriage (for example, mother's brother's daughter) is more common globally (Chagnon et al., 2017; Murdock and White, 1969). Indeed if there are prohibitions about what type of cousin is taboo to marry it tends to be the parallel cousin, often deemed incestuous (Murdock, 1967). Additionally, if parallel cousin marriage does occur it is usually of the patrilateral type as a preference for matrilateral parallel cousin marriage is exceedingly rare, if

not non-existent, based on ethnographic records (Murdock, 1967). Kinship terminology, such as whether the words for types of cousins are linguistically distinct is also determined by cultural practises of marriage and descent (Rácz et al., 2020). For example, where certain types of cousin marriage are prohibited kinship terminology may refer to that type of cousin as a sibling to reflect the marriage and incest taboo (Goody, 1970).

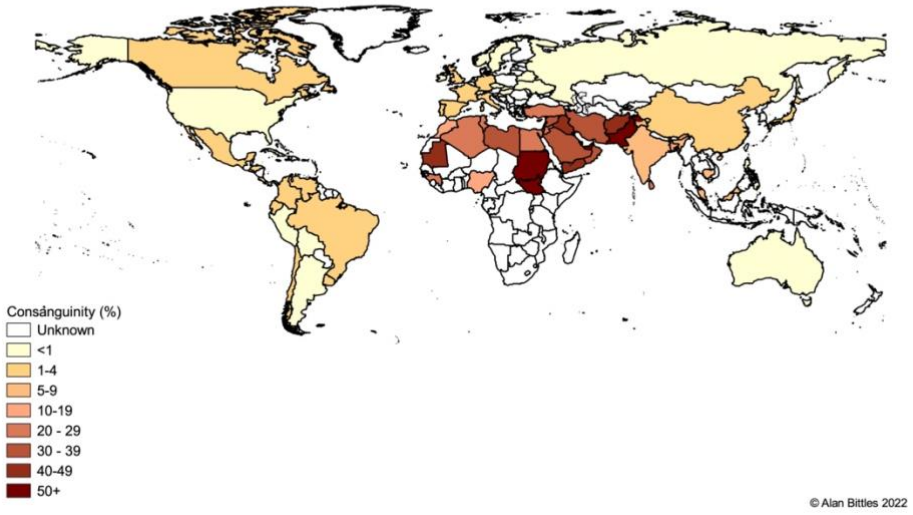


Figure 2-2 Global map of consanguinity (Bittles, 2022)

The reasons underlying the preference for one form of cousin marriage over another have been the subject of theoretical discussions. These rationales revolve around considerations of whether individuals aim to consolidate relationships between lineages or within them, whether they wish to retain wealth within lineages, and the extent to which individuals are surrounded by kin. We briefly explore all three of these factors with reference to a hypothetical patrilineal and patrilocal society.

Effect on lineage ties

In a patrilineal and patrilocal society, marriage between cross-cousins establishes marriage ties between separate settlements, as sisters and brothers tend not to reside together. By contrast, PP cousin marriage creates marriage ties within the same settlement, as men do not disperse at marriage and therefore brothers reside together. The benefits of consolidating ties within or between settlements are often argued to relate to whether survival is reliant on cooperative and altruistic ties covering a more extensive geographic area or not. Hunter-gatherers are argued to not practise much of any type of cousin-marriage, since unlike agro-pastoral societies, they do not require well-defined kin groups that can be useful for resource defence or large-scale cooperation (Walker and Bailey, 2014), possibly explaining why fitness outcomes increase with spousal relatedness for non-foragers but decrease for foragers (Bailey et al., 2014).

Effect on wealth consolidation

Cousin marriage will affect whether wealth remains within a patriline or not (Johow et al., 2019). When women inherit wealth, either at the death of their parents or via a dowry, CC marriage takes this wealth to a different settlement and lineage, though still within the related family. Marrying an unrelated individual has a similar outcome but takes the wealth to an unrelated family. In contrast, PP marriage keeps the wealth within the same patriline and settlement. The same logic applies to the bride price, in terms of whether it leaves or remains within a patriline; just as daughters may alienate property, so too may sons. The feasibility of wealth transfers also depends on the type of wealth, with movable wealth like animals or mercantile goods being more easily transferable and not diluting in value when split – unlike land, which reduces in value if broken up into smaller parcels (Goody, 1983).

Impact on relatedness

Cousin marriage will also affect who gets to live with close blood relatives. Firstly, in patrilocal societies, men are always surrounded by their male kin, such as their brothers, fathers, and uncles, because they do not disperse at marriage. If CC marriage is practised, then women will be living with kin that are from a different patriline. If PP marriage is practised women will reside with kin from their patriline as well as their immediate family since they will not have dispersed at marriage. Therefore, PP relative to CC marriage will increase the number of blood kin an individual is surrounded by, particularly so for women. Relatedness to the group has important implications for cooperation, competition, and the status of women, as outlined in section 1.2.

Tracking the effects of cousin-marriage long-term

Whilst these differences are easy to picture in one generation of cousin marriage, they become increasingly hard to track over multiple generations. For example, take a woman who marries a cross-cousin, taking her inheritance to a different patriline in which she bears children. If those children subsequently inherit and marry a cross-cousin, then that cross-cousin could be from their mother's original patriline resulting in the wealth that left being returned one generation later. Naturally, there is stochasticity in this process and the size of parcels of wealth that escape or are returned will depend on how many children the inheritance is being split between, and whether the families being married into are equally wealthy – although one would expect a degree of match due to assortative mating. Additionally, once you have multiple generations of cousin marriages it becomes unclear what the differences in group relatedness or number of surrounding kin would be between societies that practise cross compared to parallel cousin marriage.

Despite this, the assumption tends to be that PP marriage will consolidate wealth more effectively within a patrilineal group and groups will be more highly related than would occur under CC marriage. Circumstantial evidence includes that dispersal is a cross-species means to reduce inbreeding (Pusey and Wolf, 1996), population-level genetic measures of inbreeding tend to be much higher in groups

that practise PP marriage (Pemberton and Rosenberg, 2014), and ethnographic and qualitative evidence indicates that one of the reasons individuals practise PP marriage is to avoid the break-up of wealth (Aswad, 1971; Johow et al., 2019). One reason that societies that practise PP cousin marriage have higher measures of inbreeding may be that, as mentioned earlier, whilst societies that practise CC marriage tend to consider PP marriage incestuous, this is not the case for societies that practise PP marriage, who will also often marry their cross-cousin (Ayoub, 1959; Jurdi and Saxena, 2003). Indeed, some have argued that PP marriage is better seen as one end of an overall pattern of within-lineage endogamy (Ayoub, 1959). Thus, groups that practise PP marriage may well be more related as they practise higher levels of cousin marriage in general. Additionally, within a system principally structured by PP cousin marriage, cross-cousins tend to be second-degree PP cousins nonetheless (Murphy and Kasdan, 1959).

If we distinguish between intensive and extensive kinship systems, then societies that practise preferential PP marriage are likely to be at the far end of intensive kinship systems. Intensive kinship systems are characterised by behaviours that increase the relatedness of groups through endogamy, cousin marriage and limited dispersal (Lévi-Strauss, 1969; Walker, 2014). Whereas extensive kinship systems are those characterised by marriages among unrelated and geographically distant individuals, thus creating a diffuse kinship network. Intensive kinship norms, such as cousin marriage, produce overlapping and dense networks of kin that are argued to easily be aggregated into larger clans and lineages that are fairly isolated from other groups, relative to extensive kinship systems where individuals will marry between lineages and clans (Bahrami-Rad et al., 2022). These norms then dictate the preferred partners with whom to cooperate and form alliances with, based around kinship and lineage affiliation.

2.2 Parallel Cousin Marriage in the Greater Middle East

Given the broad differences between parallel and cross-cousin marriage outlined above and the broader context of extensive compared to intensive kinship, the following section will apply them specifically to the Greater Middle East to try and elucidate the reasons why such an intensive form of kinship is favoured and thus why an honour culture would be required to maintain it. The section will be split into three parts that expand on the importance given to various reasons for PP marriage, or intensive kinship more generally, including inheritance and property, patrilineal power, and female status.

2.2.1 *INHERITANCE, PROPERTY AND WEALTH*

> *"And every daughter, that possesseth an inheritance in any tribe of the children of Israel, shall be wife unto one of the family of the tribe of her father, that the children of Israel may possess every man the inheritance of his fathers."*
>
> *Hebrew Bible, Numbers 36, The Daughters of Zelophehad*

Cousin marriage has long been utilised by human kin groups as a means to consolidate family wealth. With the advent of agriculture, resources and wealth became inheritable and defensible, prompting endogamous practices that enabled kin groups to control and protect these assets (Dow et al., 2017). Agropastoralists have significantly higher levels of inbreeding and kin marriage than hunter-gatherers (Walker and Bailey, 2014) and cousin marriage, particularly PP marriage, appears to be an effective way of ensuring intergenerational transfer of wealth through the patriline (Johow et al., 2019). Additionally, the maintenance of land holdings is often cited as a motive for cousin marriage (Bittles and Hamamy, 2010; Mobarak et al., 2013), although by no means always (Hussain, 1999).

The introduction of female inheritance, as seen in Islamic societies (Sharma, 2016), may further incentivise cousin marriage to prevent the dispersion of wealth from the patriline. Across cultures, positive associations exist between the presence of Islam and PP marriage and between female inheritance and cousin marriage (Bahrami-Rad, 2021; Korotayev, 2000). This is not just a historical pattern: an analysis of cousin marriages before and after the passing of an amendment to the Hindu Succession Act in 2005, which meant that daughters were now joint heirs of property, showed an increased likelihood of marrying a cousin after the amendment was passed (Bahrami-Rad, 2021). Crucially, this was not the case for Muslims or Christians who are exempted from the amendment indicating a strong case for causality between inheritance law changes and cousin marriage. Even in instances where female inheritance is not prescribed, women may still inherit when there are no brothers. In Ancient Greece if a girl was an epiklerate (an heiress with no brothers) then she was obliged to marry her father's brother's son to avoid dispersal of the property (Goody, 1983) and in contemporary Bangladesh, one of the strongest predictors of marrying a PP cousin was if a girl had no brothers (Shenk et al., 2016).

Cousin marriages often have reduced or no bride price or dowry, simplifying marriage negotiations, which is frequently named as a chief reason for cousin marriage (Aswad, 1971; Bittles and Hamamy, 2010; Kressel, 1986; Mobarak et al., 2018). For poorer families not having to pay a bride price and/or dowry (often a small fortune) is valuable, and this may explain why cousin marriage is now most common amongst the poorest (Bittles, 1994). In Bangladesh, for example, when financial situations improve, cousin marriage decreases and families are able to afford dowries (Mobarak et al., 2013).

Moreover, PP cousins may hold certain rights over their father's brother's daughter, at least historically. A case is quoted in the Aghani – a 10th century Arabic collection of poems and songs – of a father who is scolding his daughter for resisting to marry his brother's son stating: "He is your uncle's son and of all men has first claim to you" (quoted in Levy, 1957). Often when parents wished to arrange their daughter's marriage to someone else they required the permission of the PP cousin or his father (Barth, 1986; Patai, 1955a), or had to pay him off (Aswad, 1971).

Critics of the hypothesis linking PP marriage to female inheritance argue that such a connection is only meaningful when daughters actually inherit, which does not always appear to be the case, at least in more recent times (Barth, 1986; Khuri, 1970; Moghadam, 2004). Some Historians of Islam argue that women were indeed inheriting or controlling some amount of property independently at the time of Muhammad and Islam formalised this system (Levy, 1957; Robertson Smith, 1885). However, cousin marriage may discourage women from claiming their inheritance through various means. Firstly, marriages are often arranged as double cousin marriages, where two male cousins exchange sisters as brides, resulting in the inheritance being eventually reallocated only between their grandchildren, potentially dissuading conflicts over inheritance (Bahrami-Rad, 2019). Secondly, it is also difficult to say whether one has inherited or not if one stays within the same household. Has a woman who married a PP cousin to prevent the break-up of landholdings inherited? Whilst she may not have sole ownership over a parcel of land, she, and her children, are still part owners of the landholding that was not broken up by her migrating.

Furthermore, if women inherit it is unclear why families would not receive the same amount of wealth from unrelated women marrying into the family as they lose from their daughters marrying out of the family. One possibility is that if wealth is mostly held in land, then parcels of land may still become fragmented with women who own the land not being able to live on it. Secondly, negotiations around marital wealth transfers and inheritance can be fraught and there are time inconsistency issues where families cannot compensate for the loss of wealth through a daughter marrying out until they arrange a similar marriage for their son. Similarly, there is no guarantee that families will be able to negotiate the receipt of a same-sized marital transfer for their son as they lost with their daughter. Overall, it seems a reasonable assumption that cousin marriage avoids the many opportunities for wealth escape that can occur when women either inherit or receive large dowries. Indeed, research in economics argues that cousin marriage can solve the issue that marriages are incomplete contracts as relatives are more likely to have recourse to informal enforcement mechanisms to ensure that each side upholds their side of the marriage contract (Do et al., 2013).

This theory proposing that female inheritance may influence control over female sexual behaviour through honour cultures contradicts cross-cultural literature linking matrilineal inheritance to female sexual freedom (Hartung, 1981; Holden et al., 2003). However, the context differs between these cases. In these matrilineal examples, such as the Chewa, inheritance is unilineal and post-marital residence is matrilocal (Sear, 2008). In the Greater Middle East, the inheritance is diverging (both

sexes inherit), and the marital residence systems are patrilocal, creating a much greater challenge in terms of wealth consolidation. Furthermore, as mentioned, cousin marriages (and marriages in general) are often exchange marriages, leading brothers to closely monitor their sisters' behaviour, as it affects their ability to arrange their own marriages (Aswad, 1971; Chagnon et al., 2017). Indeed diverging inheritance is associated cross-culturally with control over female sexuality, such as proscriptions on pre-marital sex (Bahrami-Rad, 2019; Goody, 1969) and, the previously mentioned amendment in 2005 that allowed women to inherit in India was followed by a decrease in reported pre-marital sex (Bahrami-Rad, 2019).

2.2.2 PATRILINEAL POWER

"Myself against my brother, my brother and I against my cousin, my cousin, my brother and I against the outsider"

Bedouin Arab Proverb (Murphy and Kasdan, 1959)

Historic and anthropological literature emphasises the Arabic sentiment of reinforcing patrilineal groups against outsiders, resulting in a social structure that allows easy aggregation of different agnatic groups into clans and tribes (Murphy and Kasdan, 1959). The Arabic kinship structure is organised around the principle of blood guilt, with blood revenge typically resting with the *raht,* a group encompassing all descendants of a great-great-grandfather and therefore everyone within 5 degrees of agnatic relationship (Murphy and Kasdan, 1959; Patton, 1901; Robertson Smith, 1885). The *raht* also encompasses who could be mobilised in war. A *hay* (tribe) consists of multiple *rahts*, who all claim descent from a common ancestor and act collectively in matters of revenge and warfare but will also commonly fight amongst themselves. This sentiment is surmised in the Bedouin proverb above which indicates how the structure of agnatic aggregation common to early Arabs, whilst containing tension within, also subordinates individual interests to those of the wider agnatic group.

Cousin marriage, particularly patrilateral parallel cousin marriage, reinforces power within families and consolidates the patrilineal group (Khuri, 1970). As mentioned, it is often part of a wider preference for lineage endogamy (Ayoub, 1959) that eventually causes the patrilineage to become "self-contained and encysted" (Murphy and Kasdan, 1959), producing the agnatic structure above. Anecdotal evidence from Lebanon also indicates that cousin marriage subordinates the interests of the individual to the wider family and that the person who marries their cousin "is often overwhelmed by family interest" and "family relationships dwarf the child, and chain people together" (Khuri, 1970).

Whilst the system described is Arabic in origin, the people of the Greater Middle East are by no means only Arabs and include diverse ethnic and linguistic groups including Kurds, Turks, Pashtuns, Hazaras, and Persians. Many of these groups, such as the Kurds, follow a similar structure and also

practise preferential PP marriage (Barth, 1986), although it is unclear to what extent the practice of PP marriage is an Arabic cultural import (Korotayev, 2000).

Pastoralism and Warfare

The consolidation of the patrilineal group through cousin marriage may be especially advantageous for pastoral nomadic groups, such as the Bedouin, who are required to collectively make decisions on issues such as warfare and migration that are easier to coordinate amongst groups of kin (Keddie, 1990). Indeed this enhanced cooperation is the reason given for why any society might practise intensive kinship in general (Walker, 2014). Pastoralists are particularly vulnerable to raiding due to their nomadic lifestyle and valuable, easily stealable wealth like livestock. Some propose that pastoralists and nomads in the Arabic peninsula and the Middle East experienced constant low-level warfare (Barth, 1986; Murphy and Kasdan, 1959; Robertson Smith, 1885) and a poet quoted in the Kamil, a classic Islamic history book written in 1231AD, stated that "the cause of the annihilation of tribes, is the violation of the duties of blood (Robertson Smith, 1885), indicating that blood feuds and kinship-based warfare may have been a common occurrence. Bonding brothers together through the marriage of their children is one way to reinforce agnatic links, and indeed one argument is that fathers forgo their right to a bride price in cousin marriage in exchange for the lifelong political allegiance of their nephew (Barth, 1986).

Pastoralism has also been linked to honour independently of cousin marriage. Nisbett and Cohen (1996) argued that honour cultures occur amongst pastoralists because animals are vulnerable to theft and law enforcement, and institutional punishment tends to be weak or absent. Therefore, groups develop a culture of revenge-taking and violence in order to deter potential attacks (see Uskul et al., 2019 for a review of evidence). Evidence also suggests that ethnolinguistic groups with a high historical reliance on pastoralism have more frequent conflict today (Cao et al., 2021). Raiding and warfare may also lead to the abduction of women as spoils of war, taken as second wives, concubines, or slaves by neighbouring groups and there is evidence that bride kidnapping may have been a common practise (Levy, 1957; Robertson Smith, 1885). Levy argues that the fear that girls would be lost in war is evident in a verse from the Hamāsa – a 9th century anthology of Arabic literature thought to contain much that is pre-Islamic in origin – which quotes an adage that "the grave is the best bridegroom and the burial of daughters is demanded by honour" (Levy, 1957). Not dissimilar is the Pashtun phrase 'khor yar ghor' meaning home or grave, referring to the only two places where a woman should be found.

Pastoralism can also be characterised by extended periods of male absence where males are less able to observe female behaviour. The concealment of women through aspects of honour cultures, such as purdah, has been proposed as a defence against these threats and a means of protection and may be another mechanism by which pastoralism or warfare is connected with honour cultures (Becker, 2019).

It's not only pastoralists but also landowners, like the Al-Shiukh in the Hatay area of Turkey, who utilise patrilateral parallel cousin marriage to consolidate their power (Aswad, 1971). Amid increasing state influence and formal individual land titling, the Al-Shiukh maintained their position as powerful landowners through within lineage endogamy. The Al-Shiukh can outline all the marriages of their lineage over five generations and in one agnatic group, 83% of its members married within it, and not one woman married out, over a period of four and a half generations (Aswad, 1971). In contrast, sharecroppers who lived in the same region, lacked significant inherited wealth, practiced exogamy, and tended to struggle to track their lineage members. Sedenterisation amplified the emphasis on agnatic descent among the Al-Shiukh, as it was the only means to secure a share of corporately owned patrimonial land. They also adhered to strict codes of honour that controlled blood feuds and women's behaviour, with honour killings occurring in response to adultery or premarital sex.

It is still somewhat unclear why the advantages of PP cousin marriage should reinforce political ties over and above out-marriage which would create new alliances and therefore also be beneficial in terms of power. Nor why only pastoral groups in the Middle East use PP cousin marriage to solve this issue whereas others, like Tibetan pastoralists, do not (Dhondup, 2019). However, if groups are genuinely requiring a level of cooperation and coordination that is greater than usual then this is arguably more likely to occur amongst kin, given kin selection and Hamilton's rule described in section 1.2.3.

The threat of romantic love

We can also get a sense of the importance of agnatic bonds through the fear of romantic love that turns up in the ethnographic record amongst groups that practise PP cousin marriage. Sexual bonds are presented as competing with the dominance of agnatic bonds as exemplified by popular wedding ditties among the Awlad-Ali, an Egyptian Bedouin group with a strong preference for PP cousin marriage (Abu-Lughod, 2016). It reads:

When he shuts the door behind him
he forgets the father who raised him

Kēf yrud il-bāb warāh
Yansā būh illī rabbāh

He reached your arms stretched on the pillow
forgot his father, and then his grandfather

tāl dhrā'ak 'al l-imkhadda
yansā būh wyansā jaddu

The verses suggest that men, if deeply enamoured, might neglect their kinship bonds. Patrilateral parallel cousin marriage mitigates this risk by subsuming the marital bond under the bond of kinship, diffusing the threat that sexuality poses to the solidarity of the agnatic group (Abu-Lughod, 2016). Cousins' loyalty to the kin group is greater than that of in-marrying unrelated women, whose primary allegiance lies with their children. In systems where wealth is jointly held, such as shared landholdings or herds among brothers and senior agnates, marrying outside the lineage may increase the pressure to divide households due to competing alliances, to the detriment of patriarchs. Amer, a Bedouin Arab from Israel describes this sentiment: "the bint el' amm (father's brother's daughter) is better. Such a wife bears trouble quietly unlike the stranger wife who rejoices at your calamity" (Kressel, 1986). The sense that couples must subsume their interests to the patrilineal group also comes up in contemporary Bangladesh where women expressed that they were less able to voice their grievances or make demands when married to cousins, for fear of breaking the family relationship (Shenk et al., 2016). Similarly, in Pakistan individuals stated that "it is usually the daughter-in-law who makes the compromises, whereas a non-related daughter-in-law will not give such concessions to the in-laws" (Hussain, 1999).

Cousin marriages may also reduce the risk of deep sexual connections developing due to the Westermarck effect and the psychological contradictions of honour cultures and cousin marriages, whereby on the one hand you are asked to protect the honour of the women of your family and at the same time you are asked to consummate a marriage with one of them. Amer clarifies: "You hold your stranger bride but you are ashamed [holding] your bint 'amm. How can you do this to bint el 'amm" (Kressel, 1986). Others describe the feeling that PP cousins are "more like siblings" (Shenk et al., 2016), that "you won't feel like talking or flirting" (Abu-Lughod, 2016), and "a manly man never marries his cousin (Khuri, 1970)".

Male desire for outsider women is sometimes controlled by gossip that can follow a man. In the Awlad-Ali, men who pursue women do not have *agl* (the virtue of self-control) and they will be ridiculed and described as *bitā sabāya,* literally meaning 'belonging to women' (Abu-Lughod, 2016). Amongst the Fulani, love is also seen as a weakness and men are ridiculed as lacking *pulaaku* - the set of qualities appropriate to a Fulani, a form of honour. "Here, it is over women that men die", a Fulani man remarked (Riesman, 1998). It is not the idea that someone might fall in love with an inappropriate person that is dangerous, but that they might love them so deeply that they do not need the wider society.

Coercion to marry cousins by older and more powerful patriarchs is one means through which this is managed, although the absence of a recognised authority to enforce this can lead to conflict among male cousins, undermining the system's stability. Kressel (1986) describes the case of the 91 descendants of Abed el 'Azim who had for many years arranged most of their marriages within the agnatic group. However, this system fell apart after the death of the patriarch as sons began to renege

on their obligation to marry their PP cousins. As one brother reneged on his cousin marriage arrangement, attempts were made for another brother to take up this obligation, who also rejected it. Male cousins turned against each other stuck in the trap of not wanting to allow their sisters to marry outsiders, at the same time as not wanting to marry their cousin.

2.2.3 WOMEN'S STATUS

"After all, she is my father's brother's daughter"

A man from Awlad Ali (Abu-Lughod, 2016)

How cousin marriage may affect women's status was touched upon in the above sections in terms of whether women forgo their inheritance or whether they are able to voice grievances. And whilst the hypothesis is that cousin marriage is an important causal factor in the development of honour cultures, with all their proscriptions on women's behaviour, it's also hypothesised that women who do marry their cousin may experience increased status, power, and protection.

Women who marry cousins will be better acquainted with their husbands and more likely to reside near their natal home and be supported by immediate kin, increasing their bargaining power within the household (Dyson and Moore, 1983). Some argue that women may forego their inheritance in exchange for protection and support from their male agnates (Aswad, 1971) and many contemporary women cite the safety and security of marrying within the family as a reason for preferring cousin marriages (Morse et al., 2012; Shenk et al., 2016). Research on the relationship between cousin marriage and intimate partner violence yields mixed results, some studies suggest that cousin marriages may offer protection (Campbell and Mace, 2022; Usta et al., 2015), whilst others find the opposite or null results (Mobarak et al., 2018; Safadi et al., 2018; Shaikh, 2016).

Additionally, PP marriages may afford women more decision-making power compared to their unrelated counterparts. In both the Awlad Ali and Al-Shiukh examples, wives who were part of the same lineage as their husbands were trusted to a much greater degree and afforded greater decision-making power (Abu-Lughod, 2016; Aswad, 1971). In the Al-Shiukh only cousin wives were able to gain control over land when widowed and their sons were too young to inherit. In Awlad Ali men expressed that they can trust their father's brother's daughter because they "care about you and your things because they are hers" and it is this wife that will be treated as head of the domestic household, entrusted with the money and decision making power over her unrelated co-wives (Abu-Lughod, 2016).

2.3 SUMMARY & SYNTHESIS

This thesis tests the hypothesis, first raised by Germaine Tillion, that cousin marriage is a driving factor in the emergence of honour cultures and honour-based violence, which acts as a system of policing over marriages. Girls are under the surveillance of their male family members from before they reach puberty, including from brothers as young as ten, who are taught to watch their sisters (Morse et al., 2012). It is these same male agnates that perpetrate honour killings. In the preceding sections, I have tried to explore some of the reasons why cousin marriage is beneficial, namely wealth consolidation and patrilineal power. Table 2-1 presents a summary of the proximate reasons discussed and the hypothesised ultimate reason. However, there remain several unanswered questions: 1) how is such a costly punishment, murdering a daughter, maintained? 2) why do offspring rebel against this marriage choice if there are benefits? 3) why are women targeted with violence to a greater degree than men, given that both should need to be coerced into marriage? I will answer each in turn, bringing together the proximate and ultimate literature to provide a rounded theory of cousin marriage and honour cultures.

Table 2-1 Proximate and ultimate reasons for patrilateral parallel cousin marriage

Ecological Context	Proximate reason	Ultimate reason
Pastoralism / Warfare	PP cousin marriage bonds brothers and agnates together increasing cooperation required to defend herds	Higher group relatedness increases cooperation via Hamilton's rule
Female Inheritance	Prevents women from leaving with inheritance. Particularly important when it comes to land inheritance	Reduces resource depletion of households and prevents geographic fragmentation of wealth
Female bargaining power	Women remain near kin who can protect her, and she may have greater access to levers of power.	Bargaining power of women increases where relatedness to the group is higher.
Conflict between wife and husband or in-laws	Reduces within family conflict due to knowing the family and her husband being able to trust her.	Sexual conflict is reduced as relatedness between dyads is higher and therefore fitness goals are more aligned
Marriage negotiations	Reduced bride price, easier negotiations. Marriage contracts less likely to be broken and easier to enforce.	Reduces resource depletion of households.

How is costly punishment maintained?

From an evolutionary perspective, to kill one's female relative, to whom you are 50% related (in the case of a father or brother) is extremely costly, as you prevent her from having children to whom you will be on average 25% related. At its most basic, for this behaviour to be maintained, the benefits, which we have outlined above, should outweigh the costs. Additionally, certain social structures can

be particularly conducive to the emergence of costly punishment, such as a society structured by close kin marriage.

As mentioned in section 1.2.5, costly and third-party punishment can emerge when there is clustering of punishers (and co-operators), such as through high strength of ties, low mobility, and punishment reputation (Boyd et al., 2003; Boyd and Richerson, 1992; Gardner and West, 2004; Hilbe and Traulsen, 2012; Nowak et al., 2010; Roos et al., 2014). PP cousin marriage likely generates extremely high strength of ties (and clustering) through producing an intensive kinship system that strengthens the patriline and increases group relatedness, whilst reducing the overall number of relatives an individual has, as no new affinal relatives are created (Khuri, 1970). Secondly, if women are marrying patrilineal kin, and it is a patrilocal society, they are unlikely to be migrating far (although endogamy does not always mean low migration see Marchi et al., 2018). Thirdly, punishment reputation is signalled, as it is crucial for the community to know that an honour killing has been committed for honour to be restored.

Furthermore, whilst honour killings are not extremely rare, they are unlikely to be common and on average may not be particularly costly given that most individuals will never have to commit one. This is synonymous with the idea that the cost of punishment decreases with increasing punishers since defectors become rare and punishment is less often meted out (Boyd et al., 2003). Interestingly, the other social structure aside from societies structured by PP cousin marriage where honour killings are documented to occur most frequently, is within the Hindu caste system where honour killings occur due to inter-caste marriage, particularly relationships between a woman and a man of a lower caste (D'Lima et al., 2020). Caste endogamy arguably also produces the high strength of ties and low mobility required to foster the emergence of costly punishment.

As long as defectors respond to being punished by cooperating in the future, and the future benefits to the punisher are greater than the costs of punishing, then the strategy of cooperate and punish defectors and non-punishers is stable (Boyd and Richerson, 1992). In the case of honour cultures, potential defectors (women who marry out, choose their own husbands, or are more sexually liberated) will likely respond to the threat of being punished. Additionally, the costs of not punishing can be extremely high as dishonoured families are ostracised and shamed within the community. Gill (2017) emphasises that the willingness of families to commit honour killings, even of a daughter they have raised and loved, shows how grave the consequences are of failing to restore honour. She argues that "in traditional societies where social mobility is limited, and where individuals' social, psychological and material prospects are closely interwoven with those of their family, tribe, or clan members, ostracism would mean the loss of not only social support but also the material resources necessary for survival". In the end, it may come down to parents being forced to make a horrible moral calculation: would you rather save one daughter, or secure the marriages and lives of her five sisters?

Why do offspring rebel against marriage choices?

What increases parent-offspring conflict that drives offspring to reject their parents' choice over their marriages? One cost that is born by the couple is inbreeding depression, which is the reduction in fitness through lower survival and reproduction of inbred individuals compared to outbred individuals. Inbreeding increases the level of homozygosity in a population and the inbreeding depression is a result of homozygosity of lethal, nearly lethal, and detrimental recessive variants. Inbreeding depression has been widely documented in humans and across the animal kingdom (Hedrick and Garcia-Dorado, 2016). Inbreeding depression can be offset through purging whereby deleterious alleles are exposed to selection via the increased homozygosity, which allows them to be selected out of the population. This can ultimately lead to lower levels of inbreeding depression in populations practising high rates of inbreeding compared to an outbred population that occasionally reproduces with close kin. This has been documented in captive populations of Drosophila (López-Cortegano et al., 2016) and in self-fertilising maize plants under experimental conditions (Roessler et al., 2019). However, purging is difficult to detect empirically in wild populations due to the difficulty in detecting changes in inbreeding depression before and after purging with sufficient power (Hedrick and Garcia-Dorado, 2016). Furthermore, purging is likely to be important in terms of lethal recessive alleles or those with large deleterious effects because they increase the selection efficiency, but less significant for detrimental traits with smaller effects, which are less easily purged by selection.

By contrast, the costs of inbreeding depression have been well documented, albeit their size is contested. For example, the offspring of consanguineous marriages in a Qatari population were found to have a higher risk for diseases such as diabetes and cancer (Bener and Mohammad, 2017), and a historical analysis using genealogical data from the Dogon of Mali and the Ancien Régime nobility of Europe found that cousin marriage led to increased child mortality (Dalzero et al., 2023). Darwin himself married his cousin Emma Wedgewood, along with several other members of his family who also married consanguineously. Indeed, analysis of the Darwin-Wedgewood dynasty indicates that men with higher inbreeding coefficients had fewer children and a shorter period of reproductive years (Álvarez et al., 2015).

At the same time, the effects of inbreeding depression are also often found to be small in magnitude and the US National Society of Genetic Counsellors states that the offspring of first cousin marriages increases the risk of birth defects by only 1.7-2.8% (Bennett et al., 2002). Additionally, much of the research does not follow individuals through life and captures only the costs of inbreeding in infancy or early childhood, thereby underestimating the effects. At the same time, selection and unobserved bias is often not addressed, which tends to overestimate the effects of inbreeding. For example, those practising cousin marriage contemporaneously tend to be poorer and less educated (Bittles, 2008), and increased child mortality can be misattributed to inbreeding depression. One study, using data from Pakistan and Bangladesh, addresses unobserved bias by using quasi-random variation in the propensity to marry consanguineously based on availability of cousins (Mobarak et al., 2018). They find that once this unobserved bias is accounted for there are no robust statistically significant effects

on child mortality, although the children of consanguineous parents did have higher rates of genetic illness. By contrast, research examining health effects across the life course and accounting for selection bias by comparing consanguineously married individuals to their siblings in a historical US population find a significant, causal, and sizeable increase in mortality throughout the lifespan (Hwang et al., 2023).

One study of the European Habsburg royal dynasty examined both inbreeding depression and purging, documenting a significant amount of both (Ceballos and Álvarez, 2013). While the coefficient of inbreeding correlated strongly with a decrease in both infant and child mortality amongst the Habsburgs, this declined in the second half of the Habsburg dynasty in line with model predictions of purging. Nonetheless the Habsburgs continued to have higher infant and child mortality than outbred individuals. Similarly, while purging may be important for the long-term survival of lineages or populations there are still likely significant fitness costs for the individuals who harbour non-lethal but still significantly deleterious mutations. The demographic conditions, such as the rate of inbreeding, under which weakly deleterious alleles can be purged in human populations is currently not known.

Of course, parents also suffer this inbreeding cost in one set of grandchildren, but it is unlikely that all offspring of a couple will marry consanguineously, thus allowing parents to reap both the material benefits of marrying some of their children consanguineously, whilst avoiding the costs of inbreeding in others. For example, amongst a Kurdish sample, eldest siblings were much more likely to be married to their cousins than younger siblings, indicating that cousin marriage may be a duty for some but not all children (Payton, 2015). Similarly, known pedigrees from a Bedouin family in Ramla, Israel, show that not all children marry cousins (Kressel, 1986). One reason for this may be that there is a balance to be struck by parents between consolidating kinship and forming marriage ties with unrelated families. The other reason may be demographic in nature in that there is no cousin of appropriate age and sex available for all children to marry. Declining birth rates in many countries may have significantly restricted the possibility of consanguineous marriage, with the number of cousins an individual is projected to have set to decline further (Alburez-Gutierrez et al., 2023). On the other hand, other countries have exhibited an increase in rates of cousin marriage that is attributed to the larger number of relatives surviving to marriageable age (Bittles, 2008). Stochastic demographic dependencies in relation to family size and availability of cousins need to be considered and formally modelled.

However, it is also important to consider the fact that cousin marriage preferences, particularly patrilateral parallel cousin marriage, often form part of a wider practise of within lineage endogamy, as detailed in section 2.1 and 2.2 and argued by Ayoub (1959). Often, if the preferred first cousin is not available, individuals may instead marry a second cousin, or failing that a more distant but within lineage member. Ayoub (1959) documents this in a Druze population of Lebanon in which 9.1% of

marriages were between PP cousins (which he argues is "as high a rate as can be attained in a naturalistic setting, considering the need to match up ages, and, sometimes, socio-economic status and location"), which form part of a larger group of marriages within the lineage, which form part of the 63.4% of marriages that are between kin.

Cousin marriage may also induce sibling-sibling conflict as everyone can reap the social benefits of their sibling marrying consanguineously whilst avoiding the costs themselves. Indeed, this is what we saw in the example of the 91 descendants of Abed el 'Azim where brothers reneged on their cousin marriage arrangements once there was no one to enforce them (section 2.2.2). Additionally, whilst evidence was given that consanguineously married women have higher status than their outsider counterparts, more contemporary examples indicate that women also feel controlled by their relatives when married consanguineously and would rather 'make new relatives' with whom they can feel freer (Hussain, 1999; Shenk et al., 2016).

Evolutionary conflicts can exist without any sign of overt resistance simply due to the cost of resistance being too high (Kokko and Jennions, 2014), which may be the case when an honour culture is functioning properly. Indeed, it has been noted that honour killings are rare among the conservative upper classes in Pakistan, where women are able to be successfully controlled through the strict observance of purdah and the lack of interaction with any males who are not immediate family (Khan, 2006). Poorer families may struggle if they need women to partake in wage labour or if the men are too occupied in their own work to keep a sufficient eye on their female family members. Amongst the conservative upper class, the costs of resistance are likely to be too high for women. We see trends consistent with this argument in immigrant communities in Western countries where girls are exposed to Western influences at school that can threaten to dishonour her family (Gill et al., 2014). In both cases the effort required for surveillance of girls and the likelihood of exposure to unrelated men and 'foreign' influences increases, and thus simultaneously the costs of resistance go down.

Why are women targeted with violence to a greater degree than men?

There are three reasons why men may potentially be subject to less coercion. The first is that it is less costly to punish or murder women than men. Men are stronger and more likely to be able to resist, but perhaps more importantly, the murder of a man may trigger the start of conflict within factions of a larger patrilineage (Boehm, 2011). Secondly, the strength of a lineage depends on the number of men and therefore the loss of a man would weaken it. By contrast, although the lineage is dependent on women to reproduce it, women can be brought in from outside to give birth to sons to continue the family line, whereas this is not the case for men. Thirdly, the cost of marrying consanguineously may be higher for women than men, increasing the degree of parent-offspring conflict for daughters, as well as sexual conflict between the girl and her cousin groom. This can occur if men are able to marry polygynously having both related and unrelated wives, if brothers gain fitness benefits from their sisters marrying relatives through marriage exchanges, and if it allows males to marry a younger woman or avoid a shortage of mates (Aswad, 1971; Chagnon et al., 2017; Dalzero et al., 2023).

Testing the hypothesis

There is convincing evidence that female inheritance is sometimes associated with cousin marriage (Bahrami-Rad, 2021), that pastoralism is associated with warfare and norms of revenge-taking (Cao et al., 2021), and that a lack of institutional punishment can lead to the evolution of honour (Nowak et al., 2016). However, bar one empirical paper suggesting that individuals who were forced to marry their cousins are at higher risk of honour-based violence (Payton, 2015), few researchers have tested whether cousin marriage leads to honour-based violence. It is this question – whether cousin marriage is associated with honour-based violence – to which this thesis makes a large contribution. Of course, this hypothesis relies on the verbal theory outlined above that describes what the costs and benefits of cousin marriage, particularly PP cousin marriage, are. Relying on verbal theory can be unreliable but empirically or mathematically testing this verbal theory is beyond the scope of this thesis, although I make some first attempts in Chapters 4, which examines whether cousin marriage reduces the risk of intimate partner violence, and 5, which tests whether female inheritance and pastoralism associate with the strength of an honour culture. Instead, this thesis examines whether cousin marriage is a risk factor for honour-based violence and examines this question at multiple levels of analysis: at the individual level (Chapter 4), between ethnolinguistic groups (Chapter 5) and between regions within countries (Chapter 7). I also test whether other ecological variables that can affect the marriage market, such as the sex ratio, influence the rates of different types of violence against women (Chapter 6). To answer these questions, I draw from multiple different datasets that are outlined in the following chapter.

CHAPTER 3: DATA

Throughout this thesis several different datasets will be used including the Demographic Health Surveys (DHS); the Pew Research Centres' dataset titled The World's Muslims: Religion, Politics, and Society; the Human Origins Panel; and the Independent Human Rights Commission of Pakistan's (HRCP) dataset on news reports of violence against women. Given the sensitivity of data on violence against women, particularly honour-related violence, for which data has rarely been collected, choices were made principally based on the availability of relevant variables – those relating to cousin marriage and violence. Secondly, data varies in terms of whether it is a direct measure of the behaviour of interest or a proxy, and the extent to which the data is biased. Some datasets, such as the Demographic Health Surveys are nationally representative and suffer from relatively lower levels of non-response. Other datasets, such as those based on media reports, will suffer from a much higher degree of selection bias. This chapter will briefly introduce the datasets that will be used in this thesis and present some descriptive statistics on the key variables.

3.1 DEMOGRAPHIC HEALTH SURVEYS

The DHS Program was established by the United States Agency for International Development (USAID) in 1984 and has given assistance to over 350 surveys in 90 lower-income countries, thoroughly advancing the understanding of health and population trends. The DHS program is a selection of large nationally representative household surveys that collect data on a large range of variables related to population, health, and nutrition. One of the principle aims of the program is to collect data that is comparable across countries and standard questionnaires have been developed to achieve this. The standard questionnaire, which all participating countries adopt in its entirety, includes questions on fertility, child health, maternal health, family planning, and marriage. Since its inception, the DHS has also expanded to include several specialised survey instruments such as the Domestic Violence Module.

This thesis makes use of the DHS data from the following countries and years: Jordan, 2007, 2012, 2018; Pakistan 2012, 2017; Egypt 2014; Turkey 2013 (The DHS Program, 2022). These countries were selected based on the availability of data on cousin marriage and violence against women. Principal variables used include whether a woman was married to a blood relative, whether she had ever received physical violence from an intimate partner, whether she had ever received physical violence from someone other than an intimate partner, whether she justified violence from a husband under several circumstances, and whether she was employed outside the home.

All surveys are based on area probability designs with proportional stratification by region and urbanisation. Each administrative region is separated into urban and rural areas to produce a varying number of sample strata. There is then a two-stage selection process where several clusters are

selected within each stratum with probability proportional to their size, which in turn is based on the number of residential households within each cluster. Then a fixed number of houses are selected with an equal probability from each cluster. In each selected household all ever-married women aged 15-49 are eligible for the standard interview and one is randomly selected to additionally complete the domestic violence module. In Turkey, selection differed slightly with all women aged 15-49 being eligible, not just those who had been married. Further details on sample design and interview selection can be found in the final reports of each survey for each country (available at dhsprogram.com).

DHS data is used in all analytical Chapters 4, 5, 6, and 7.

3.1.1 DESCRIPTION OF KEY VARIABLES

Below I describe the key variables used from the DHS in this thesis and how they were constructed. I also present some descriptive tables to demonstrate their distributions.

Variable: Cousin Marriage

Countries: Jordan, Egypt, Pakistan, Turkey

Years used: Jordan: 2007, 2012, 2017; Egypt: 2014, Pakistan: 2012, 2017, Turkey: 2013

Survey question: "Before you got married, was your (first) husband related to you in any way?"

Possible answers: The granularity of answer differed between countries. Jordan provided the most detailed breakdown of consanguineous marriage types:

a) Double first cross-cousin
b) Double first parallel cousin
c) Patrilateral parallel cousin
d) Patrilateral cross cousin
e) Patrilateral second cousin
f) Matrilateral parallel cousin
g) Matrilateral cross cousin
h) Matrilateral second cousin
i) Other relationship
j) Unrelated

The Pakistan data was the least granular and did not differentiate between parallel and cross. Possible answers included:

a) First cousin on father's side
b) First cousin on mother's side
c) Second cousin

d) Other relationship
e) Unrelated

Variable construction: For Chapter 5 a binary variable was constructed where individuals were given a score of 1 if they were related to their husbands as first cousins and a score of 0 if they were more distantly related or unrelated to them. Below I present the percentage and number of people married to their first cousin for each country and survey year. For Chapter 4 the full detail of possible cousin marriage type was needed, which was only available for Jordan. Please see Chapter 4 for a detailed breakdown of cousin marriage types (Table 4-2).

Table 3-1 Percentage and number of women married to their first cousins by country and survey year

Country (year)	First cousin marriage	Not first cousin marriage	Missing data
Jordan			
2007	27% (2937)	73% (7939)	0
2012	25% (2808)	75% (8544)	0
2017	20% (2892)	80% (11797)	0
Egypt			
2014	17% (3748)	83% (18013)	0
Pakistan			
2012	46% (6247)	54% (7296)	0
2017	47% (7115)	53% (7949)	0
Turkey			
2013	17% (1629)	83% (8103)	0

Variable: Intimate-partner violence

Country: Jordan

Years used: 2007, 2012, 2017

Survey question: "Did your (last) husband ever do any of the following things to you:

a) Push you, shake you, or throw something at you?
b) Slap you?
c) Twist your arm or pull your hair?
d) Punch you with his fist or with something that could urt you?
e) Kick you, drag you, or beat you up?
f) Try to choke you or burn you on purpose?
g) Threaten or attack you with a knife, gun, or other weapon?

Possible answers:

a) Never
b) 0-11 months ago
c) Yes, but don't remember when
d) Yes, but frequency in last 12 months

Variable construction: A binary variable was constructed where individuals were given a score of 1 if they answered yes to any of the above options and a score of 0 if they answered no to all of them. This variable was used in Chapter 4.

Table 3-2: Percentage and number of women who reported receiving violence from their husband by survey year

Jordan			
Year	**Received violence from husband**	**Did not receive violence from husband**	**Missing data**
2007	19.60% (675)	80.40% (2769)	0
2012	19.44% (1366)	80.56% (5661)	0
2017	14.83% (1016)	85.17% (5836)	0
Total	17.65% (3057)	82.35% (14266)	0

Variable: Natal-family violence

Country: Jordan

Years used: 2007, 2012, 2017

Survey question: "From the time you were 15 years old has anyone other than (your/any) husband hit you, slapped you, kicked you, or done anything else to hurt you physically?"

If yes: who has hurt you in this way?

Possible answers: Respondents were able to freely list the individuals.

Variable construction: A binary variable was constructed where individuals were given a score of 1 if they named any related family mother, which included a mother, father, sister or brother. No other blood relative was named. Missing data were removed from the analyses. This variable was used in Chapter 4.

Table 3-3: Percentage and number of women who reported receiving violence from a natal family member by survey year

Year	**Received violence from family member**	**Did not receive violence from family member**	**Missing data**
2007	16.41 % (565)	83.59% (2879)	0

2012	15.17% (1065)	84.83 % (6531)	8
2017	5.00% (332)	95.00% (6304)	216
Total	11.47% (1962)	88.53% (15137)	224

Variable: Justification of violence

Country: Jordan, Egypt, Pakistan, Turkey

Years used: J: 2007, 2012, 2017; E: 2014, P: 2012, 2017, T: 2013

Survey question: "In your opinion, is a husband justified in hitting or beating his wife in the following situations:

a) If she goes out without telling him?
b) If she neglects the children?
c) If she burns the food?
d) If she insults him?
e) If she disobeys him?
f) If she argues with him?
g) If she has relation with another man?

Possible answers: Yes, No, Don't know

Variable construction 1: A binary variable was constructed where individuals were given a score of 1 if they justified violence in any situation and a score of 0 if they believed it to be unjustified or if they did not know. This was used in Chapter 4 and used only data from Jordan.

Table 3-4: Percentage and number of women who reported that violence against a wife was justified in at least one scenario by survey year

Jordan			
Year	**Justified violence**	**Did not justify violence**	**Missing data**
2007	76.66% (2640)	23.34% (804)	0
2012	44.84% (3151)	55.16% (3876)	0
2017	26.77% (1834)	73.23% (5018)	0
Total	44.02% (7625)	55.98% (9698)	0

Variable construction 2: A binary variable was constructed for only sub question a: if she goes out without telling him. This was used in Chapter 5 as a proxy for an honour culture.

Table 3-5: Percentage and number of women who reported that violence against a wife was justified if she goes out without telling him by country and survey year

Country (year)	Justified violence	Did not justify violence	Missing data
Jordan			
2007	40% (4388)	60% (6418)	0
2012	14% (1534)	86% (9778)	0
2017	9% (1259)	91% (13363)	0
Egypt			
2014	24% (5318)	76% (16266)	0
Pakistan			
2012	33% (4511)	67% (8816)	22
2017	36% (5473)	64% (9270)	2
Turkey			
2013	6% (545)	95% (9175)	3

Variable: Employment outside the home

Country: Egypt & Pakistan

Years used: E: 2014, P: 2012, 2017

Survey question:

a) "Aside from your own housework, have you done any work in the last seven days even if it was only for a short period of time?

b) "Do you usually work at home or away from home?"

Possible answers:

a) Yes or no

b) At home or away from home

Variable construction: A binary variable was constructed where individuals were given a score of 1 if they were employed outside the home and a score of 0 if they were either unemployed or employed inside the home. This was used in Chapter 5 as a proxy for an honour culture.

Table 3-6: Percentage and Number of women who are employed outside the home by country and survey year

Country (year)	Employed outside the home	Either employed inside the home or not employed	Missing
Egypt			
2014	15% (3195)	85% (18539)	28
Pakistan			
2012	13% (1651)	87% (11527)	380
2017	8% (1193)	92% (13492)	383

3.2 THE PEW RESEARCH CENTER

The Pew Research Center is a self-described non-partisan 'fact tank'. They principally conduct public opinion polling and demographic research that can support decision making but they do not take any policy positions. Their research areas include global attitudes and trends, social and demographic trends, US politics and policy, internet and technology, and religion and public life. For this thesis data is drawn from a survey titled "The World's Muslims: Religion, Politics and Society" (Pew Research Centre, 2013).

Between 2008 and 2012 surveys were administered to Muslim participants (18+) in 39 countries from across Africa, Asia and Europe resulting in over 38,000 face-to-face interviews in over 80 languages and dialects. Whilst the survey is based on national samples that did not exclude non-Muslims, findings are reported exclusively for Muslims. Samples that were not national included Thailand, where only Muslims were sampled, and Bosnia-Herzegovina and Russia where oversampling was conducted in areas known to have larger Muslim populations.

Similar to the DHS, sampling was designed through stratifying by region and urbanity, followed by the selection of primary sampling units within each stratum that were proportional to population size, followed by random sampling of households from within these units, and random selection of one individual from each household. Questionnaires were translated, back translated to check comprehension, and piloted. More information can be found in the complete report: "The World's Muslims: Religion, Politics, and Society" (Pew Research Centre, 2013) where fieldwork dates for each country and how nationally representative each survey was can be found.

The principal variables of interest relate to beliefs about honour killings and the ethnicity of the respondent. Participants were asked to what extent they agreed with the following statement: "Some people think that if a woman engages in premarital sex or adultery it is justified for family members to end her life in order to protect the family honour". This question was repeated but in reference to a man instead of a woman. Given the diversity of the countries that the survey was administered in

some questions had to be adapted to local sensitivities. Explicit references to premarital sex and adultery were deemed too sensitive to be asked in Afghanistan, Uzbekistan and Iraq and the question was altered to: "Some people think that if a woman brings dishonour to her family it is justified for family members to end her life in order to protect the family honour".

The only publicly available variable relating to location is the respondent's country of origin, but the genetic data drawn from the Humans Origins Panel (see section 3.3) that I match to the Pew survey data for analyses in Chapter 5 is at the ethnic group level. Previously ethnicity was not shared publicly for privacy and safety reasons, but due to the time elapsed since the original survey upon request, the Pew Research Center generously made the ethnicity data available to me. A special dataset use agreement was signed on the 28th of June 2022 and whilst I do not use the data to make any policy recommendations, I also emphasise that the opinions expressed herein, including any policy implications, are those of the author and not of Pew Research Center.

Unlike the DHS data (section 3.1) and the HRCP data (section 3.4), which are data on actual behaviour, such as whether someone has been a victim of violence; the Pew data allows individuals to express an opinion or belief without incriminating themselves. Additionally, the Pew data includes responses from men, whereas the variables of interest in the DHS are solely from female respondents. All surveys are likely to suffer from respondents omitting information or lying, perhaps due to social desirability bias and this is likely to occur in the direction of individuals understating the violence they have received or their propensity to commit violence (Gibson et al., 2020; Lawson et al., 2021).

The Pew data is used in Chapter 5.

3.2.1 DESCRIPTION OF KEY VARIABLES

Variable: Justification of honour-based violence

Survey question: "Some people think that if a woman engages in premarital sex or adultery, it is justified for family members to end her life in order to protect the family's honour. Others believe that this practice is not justified, no matter the circumstances. Do you personally feel that this practice is often justified to defend the family honour, sometimes justified, rarely justified, or never justified?"

The question was repeated with reference to men instead of women.

In three countries – Afghanistan, Iraq, and Uzbekistan – the wording of the question was slightly altered by removing references to premarital sex or adultery and replacing them with "brings dishonour to the family", due to sensitivities in these countries. As such, respondents from these countries were given a more general question in which they had to infer what constituted dishonour.

Variable construction: Individuals were given a score of 1 if they believed violence was often or sometimes justified and a score of 0 if they believed it was rarely or never justified, or if they did not know. Please see Figure 5-1 for a breakdown of this binary variable by ethnicity. Below I present the

full distribution of the variable for each country for both honour killings against women and men (Figure 3-1).

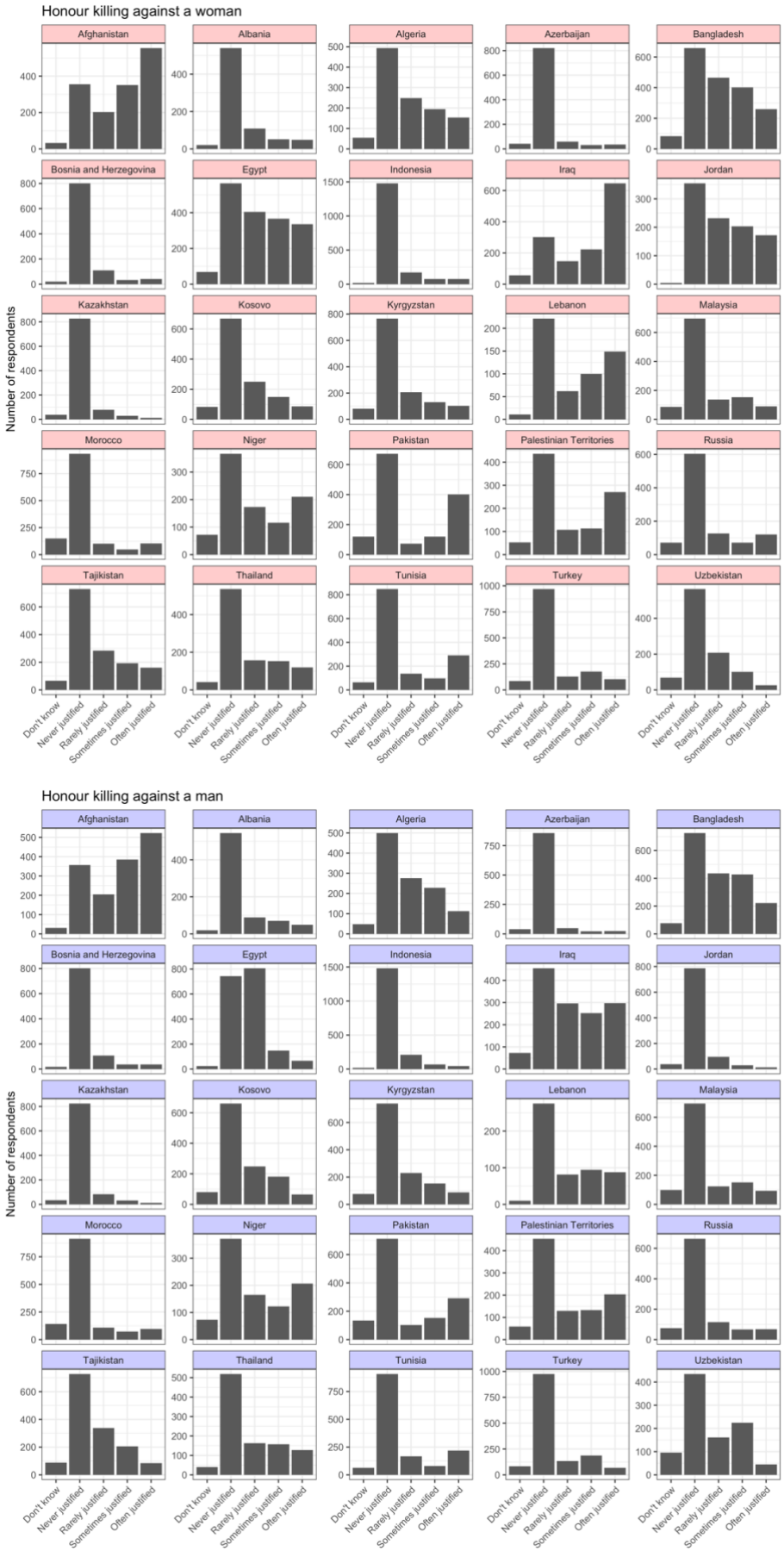


Figure 3-1: Number of respondents who justified honour killings against women (first panel) and men (second panel) by country of residence.

3.3 HUMAN ORIGINS PANEL

The Human Origins Panel is a publicly available dataset of genome-wide SNP data described in Lazaridis et al. (2014), containing genetic data on 9460 present-day individuals and 3,723 ancient individuals from across the world that were compiled from previously published genetic research. For this research, I use 594,924 single nucleotide polymorphisms (SNPs) from 1963 individuals belonging to 83 ethnic groups that match the ethnicities reported by the respondents from the Pew dataset (section 3.2).

The dataset was used to calculate population-level average genomic inbreeding coefficients from runs of homozygosity (ROH). ROH are contiguous regions of the genome where an individual is homozygous across all sites and results from common ancestry. Common ancestry can be produced by cousin marriage, as well as other demographic processes such as population bottlenecks, and ROH vary in their length, with longer ROH indicating more recent inbreeding events and shorter ROH more distant ones (Ceballos et al., 2018). Varying the cut-off length for the minimum size of ROH measured allows us to isolate ROH that are likely to have resulted from consanguineous marriage rather than from small population sizes. ROH are a well-established means of detecting parental relatedness and consanguinity and have been found to associate strongly with known pedigrees (Ceballos et al., 2018; Kirin et al., 2010; McQuillan et al., 2008; Ringbauer et al., 2021).

Importantly, measuring cousin marriage in this way does not rely on having a known pedigree or a baseline population (the first ancestor in a pedigree). This also allows us to capture a measure of cousin marriage that has occurred over several generations rather than using survey data which usually only captures 1 or 2 generations. This is important for several reasons. Firstly, cousin marriage rates can fluctuate through time depending on other factors such as wealth and urbanisation (Bittles, 1994; Hamamy et al., 2005). Secondly, most of the theory is couched in historical terms to explain why honour cultures have emerged in this part of the world since pre-Islam. As such, the dynamic of interest is likely to be the amount of cousin marriage that was going on historically which a genetic measure is better able to capture. At the same time, contemporary levels of cousin marriage may also reflect high levels having gone on in the past.

The use of genetic data in cross-cultural social science research is rare, partly because until recently few large publicly available genetic datasets covered a diverse range of populations. However, there are notable exceptions, mostly in economics. Previous research has used genetic data to demonstrate that genetic distance between populations is negatively associated with development, with more closely related populations argued to face fewer barriers to knowledge exchange and thus development (Spolaore and Wacziarg, 2018, 2009). More recently, advances in genetics that have allowed greater numbers of populations to be sampled, have led to further research demonstrating

that the genetic measure of kinship intensity, measured through ROH, is negatively associated with economic development (Bahrami-Rad et al., 2022).

The Human Origins Panel is used in Chapter 5.

3.3.1 DESCRIPTION OF KEY VARIABLES

To avoid lengthy repetition please see Chapter 5 for a detailed description of how to calculate population-level average genomic inbreeding coefficients and Figures B1 and B2 in the Appendix for the bar plots depicting the distribution of ROH of varying lengths across the 52 ethnicities included in the analysis.

3.4 HUMAN RIGHTS COMMISSION OF PAKISTAN

The HRCP was co-founded in 1987 by a group of human rights defenders including Asma Jahangir and is an independent and non-profit organisation. The HRCP is committed to realising the complete scope of human rights and uses the framework provided by the freedoms guaranteed in the Constitution of Pakistan as well as the international human rights agreements to which Pakistan is a signatory. For example, Pakistan ratified the UN's Convention on Elimination of Discrimination Against Women (CEDAW) in 1997. The HRCP publishes a flagship annual report, State of Human Rights, which is one of the most comprehensive reports available on human rights in Pakistan (available at hrcp-web.org/hrcpweb/annual-reports/). The HRCP works over a wide range of areas and human rights abuses including, press freedom, religious or minority persecution, forced disappearances, suicide, domestic violence, sexual violence, honour killings, and capital punishment. Their main campaigns deal with awareness raising and include seminars, demonstrations, workshops, and general advocacy. Their day-to-day work includes monitoring legal developments, lobbying with lawmakers and the state, and collecting data on human rights issues reported in the press.

The HRCP has been systematically compiling data on human rights abuses in the press since 1996, with digitisation of these datasets beginning in 2015. Human rights abuses for which data is collected include but are not limited to, enforced disappearances, sectarian matters, custodial torture, suicide, and all forms of gender-based violence. For this thesis, I use the digitised datasets on honour killings, sexual violence, and suicide from 2015-2022. The sampling procedure is as follows. Employees of the HRCP located in 8 offices across Pakistan scan 27 newspapers each week and search for keywords relating to human rights abuses. The list of 9 offices and newspapers can be found in Table 3-1 and the list of keywords relating to the variables of interest can be found in Table 3-2. The quantity of newspapers covered is large and relates to the credibility of their reporting as decided by the HRCP. All major English language newspapers are covered, as they are deemed the most credible, along with

a selection of Urdu and Sindhi newspapers. Many local newspapers are not covered as they are not deemed credible enough.

Table 3-7 List of HRCP offices and the newspapers they scan and compile reports of human rights abuses from.

Region	Office	Newspaper
Punjab	Lahore	Dawn Dawn (Metro Islamabad) Nation Express tribune The News Jang Nawaiwaqt Daily express Duniya Voicepk.net Friday Times - Naya Daur Dawn Prism
	Multan	Jang (Metro) Express (Metro) Dunya (Metro)
Sindh	Karachi	Dawn (Metro) Express (Metro)
	Hyderabad	Pahenji Kavish
Balochistan	Quetta	Jang (Metro) Daily Intekhab
	Turbat	Daily Intekhab (Metro)
Khyber Pakhtunkhwa	Peshawar	Mashriq Aaj Express (Metro)
Gilgit-Baltistan	Gilgit	Ausaf Baad-e-Shimal

Table 3-8 Keywords used by the HRCP relating to the subcategories of human rights abuses of interest to us.

Main Category	Subcategory	Keywords
Gender-based violence	Physical violence	Beating, torture, burning, killing, kidnapping, abduction, violence against women, violence against transgender,
	Sexual violence	Rape, sexual assault, sexual abuse, molestation, kidnapping, women trafficking, sexual exploitation, cyber harassment, workplace harassment, incest
	Harmful custom practices	Honor killing, murder, Karo-kari, Wani, swara, Kala-Kali, forced marriages, underage marriages, acid crime, dowry-related violence, son preference
	Domestic violence	Physical violence, sexual violence, verbal abuse, threats, psychological violence, economical
Crimes	Suicide	Suicide attempt, self-immolation, reasons (poverty, unemployment, psychological violence, mental health, etc.)

If a human rights abuse is documented in the press the HRCP record as many key variables as possible. For gender-based violence this includes the area, whether the victim was male or female, how many victims there were, what the relationship between the victim and perpetrator was, the reason for the violence, the method of violence and the date of the report. Newspaper articles vary considerably in the amount of detail given for the case and therefore many of the variables suffer from a high degree of missingness. The full text of the media article is also saved. An example press report for an honour killing, a case of sexual violence, and a case that involved both rape and honour killing can be seen in Figures 3-1 to 3-3. Cases where a victim suffered both sexual violence and an honour killing were usually because she had been dishonoured by being raped and was subsequently murdered to restore honour. In these instances, the case was recorded in both the honour killing dataset and the sexual violence dataset. All reports are checked for duplication, since the same case can be reported in multiple news outlets. After being checked, the reports are then entered into a digital dataset.

Details for Information Required	
ID	3070867
Date of Event	2022-07-29
Newspaper	Dawn
Province	Punjab
City	Narowal
Headlines	Teenage girl gang-raped

News Details

NAROWAL: A 16-year-old girl was allegedly gang-raped by two persons at her home in the neighbourhood Murghikhana on Wednesday evening.

The complainant, mother of the girl, told the police she went out with her husband at 8pm to buy medicines while her children were at home. Meanwhile, two locals broke into the house and gang-raped her daughter.

She said when they returned, the suspects were assaulting her. Seeing them, the suspects fled brandishing a sharp-edge instrument. Parents shifted the unconscious girl to the Narowal District Headquarters Hospital in a critical condition.

The Narowal City police registered a first information report on Thursday against the suspects and arrested them.

The police conducted the medical reports and DNA tests of the evidence of the incident.

Published in Dawn, July 29th, 2022

Figure 3-2: Example sexual violence report

Details for Information Required	
ID	3068167
Date of Event	2022-07-17
Newspaper	Dawn
Province	Punjab
City	Rahim Yar Khan
Headlines	Woman killed over marriage of choice

News Details

RAHIM YAR KHAN: A woman was killed by her brother and uncle at village Mud Alyas in the limits of Saddar police of Khanpur tehsil for contracting a marriage of her choice.

Reports said 'S' was engaged with her cousin, Ijaz. But two months back, she escaped from home and contracted a court marriage with Imran Arian.

She came back to meet her parents on Saturday when her brother, Aslam, and uncle, Fayyaz, shot her dead. When the woman's parents tried to save her, they were also injured in the firing and had to be shifted to the Shaikh Zayed Hospital in critical condition.

Police arrested the suspects, recovered the murder weapon and registered a case against them.

Figure 3-3: Example honour killing report

Details for Information Required	
ID	3039698
Date of Event	2022-02-07
Newspaper	The Friday Times – Naya Daur
Province	Punjab
City	Sargodha
Headlines	Victim Shot Dead By Brother Days After Gang-Rape In Sargodha

News Details

A 28-year-old woman was shot dead by her brother just days after she was gang-raped by four men in village Behk Lurka of tehsil Kot Momin in Sargodha.

The woman had allegedly been raped just days prior to her death by four men from an influential family in the area. Although police had registered a case against the suspects, the victim's brother was reportedly frustrated that police had not taken further action.

In a fit of rage, the brother, along with two accomplices, shot his sister dead on Sunday before fleeing, according to police. When later apprehended, he said he was also planning to kill the four alleged rapists.

The brother told police that he took matters into his own hands because he believed police were not doing enough. He said that the family of the alleged rapists was pressuring his family to 'reconcile' with them.

Police claim that the rape suspects had obtained interim pre-arrest bail until February 11th.

Each year, hundreds of women in Pakistan are murdered by family members over perceived damage to "honour" that can involve eloping, fraternising with men, or any other infraction against conservative values that govern women's modesty.

According to statistics from the Punjab Information Commission on behalf of the Punjab Police, in the last six months alone 2,439 women were raped, 9,529 were kidnapped, while 90 women were killed on the name of 'honour' in Punjab.

Figure 3-4: Example honour killing and sexual violence report

Datasets compiled from newspaper reports suffer from a high degree of selection bias. Firstly, while the list of newspapers covered by the HRCP is comprehensive there are undoubtedly some newspapers that are not able to be covered. Secondly, whether a case ends up being reported in a newspaper is a further source of selection bias. There are many factors that can influence selection in media reporting including: event characteristics, such as how intense or violent the event being recorded is; the actors involved in an event, such as whether a person is culturally significant; the location of the event, such as whether the location is serviced by the media or journalist 'beats'; media attention cycles, such as whether a particular issue is currently prominent; and political orientation of a particular outlet (Ortiz et al., 2006). Some have argued that bias is so severe that data drawn from newspaper events often does not meet acceptable standards for analysis and researchers rarely fully address the limitations (Ortiz et al., 2006). By contrast, others have argued that datasets drawn from newspaper reports are in fact an improvement on previous methods (Earl et al., 2004). This is because newspaper reports have principally been used in research on the causes of collective action and protest events, in which case social scientists would commonly only sample areas where events were known to happen, thereby also building datasets which suffered from high degrees of selection.

Researchers have attempted to correct for selection bias by devising weights or by explicitly modelling or controlling for the causes of selection bias (Hug and Wisler, 2006). Others have proposed the triangulation of multiple media sources so as to capture more events (Koopmans and Rucht, 2002), rather than relying only on one or two sources, as I do here, thanks to the diligent work of the HRCP.

The HRCP data is used in Chapters 6 & 7.

3.4.1 DESCRIPTION OF KEY VARIABLES

Administratively Pakistan can be divided into 7 provinces (or 6 if you consider the Federally Administered Tribal Areas together with Khyber Pakhtunkhwa), 160 divisions and 577 districts. Each case of violence was mapped to a district of Pakistan. Below I present the number of reported cases of honour killings, sexual violence, and male suicide from across the 7 provinces.

Table 3-9: Total number of reported cases of honour killings, sexual violence, and suicide across the 7 regions of Pakistan
*** includes Capital. KPK = Khyber Pakhtunkhwa, FATA = Federally Administered Tribal Areas**

	Honour killing	Sexual violence	Suicide
Punjab*	5166	9055	12854
Sindh	1926	1057	4480
KPK	1255	328	1216
Balochistan	308	39	141
Gilgit Baltistan	7	7	9
Azad Kashmir	6	8	4
FATA	7	3	0

I also present the district level heat maps for the number of reported cases of honour killings, sexual violence, and male suicide per 10,000 people for Punjab and Sindh to demonstrate the variation across these two provinces. Please see Chapter 6 (Figure 6-3) for a division level heat map across the whole country.

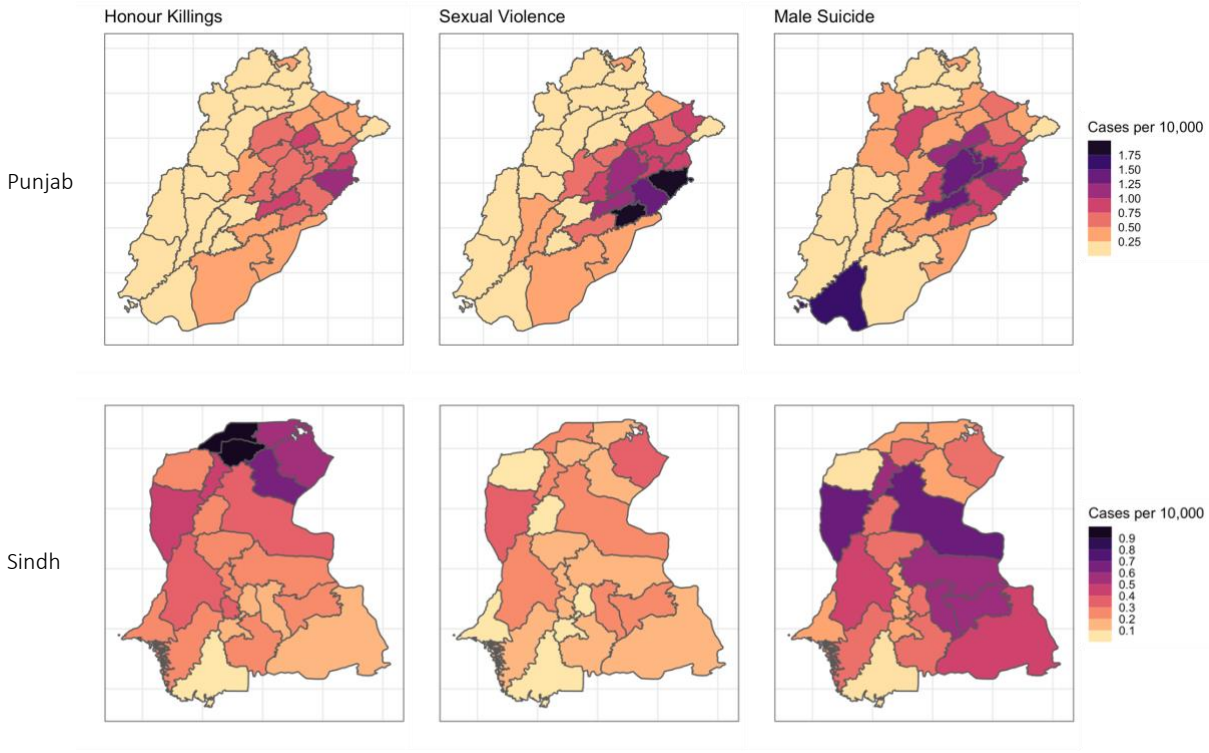


Figure 3-5: district level heat maps of the number of reports per 10,000 people of honour killings, sexual violence and male suicide for Punjab and Sindh. Note the different scales for the two regions.

3.5 Other Datasets

Additional datasets were required when performing the cross-cultural study in Chapter 5 to test and control for relevant country or ethnic-level variables such as GDP, inheritance and subsistence. In Chapter 6 the district level covariates were taken from the Pakistan Census. The datasets and a brief description can be found in Table 3-3.

Table 3-10 Additional datasets used throughout this thesis

Chapter	Data Source	Variable used	Description
5	D-Place (Database of Places, Language, Culture, and Environment).	Reliance on pastoralism (EA042), presence of female inheritance (EA074 & EA076)	D-Place is a publicly available database containing cultural information for over 1400 societies (Kirby et al., 2016). It brings together a large wealth of data that had previously been available in separate repositories including Murdock's Ethnographic Atlas (Murdock, 1967) and the Binford Hunter-Gatherer database (Binford, 2019).
	Penn World Tables	GDP for the year 2012	A set of national accounts that uses detailed prices to calculate purchasing power parity of each currency allowing comparison of real GDP across countries and over time.

	Glottolog	Language family	A catalogue of the world's languages, language families and dialects.
	Human Relation Area Files (HRAF)	Reliance on pastoralism, presence of female inheritance	HRAF is a non-profit organisation based at Yale University that promotes understanding of cultural diversity. It provides eHRAF World Cultures, an online indexed database that contains ethnographic collections covering all aspects of life. Each paragraph is subject indexed allowing researchers to search by cultures and subject matter. I use eHRAF to code any societies that had missing data in D-PLACE.
6 & 7	Pakistan Census	Population size, urbanisation, number of police stations, literacy, home ownership, education.	A census administered by the Pakistan government in 2017.

CHAPTER 4: DIFFERENT PREDICTORS OF INTIMATE PARTNER AND NATAL FAMILY VIOLENCE AGAINST WOMEN

The results presented in this chapter have been peer-reviewed and published in Evolutionary Medicine and Public Health under the title "Different predictors of intimate partner and natal family violence against women" and co-authored by my supervisor, Ruth Mace (Campbell and Mace, 2022). Some graphs and tables have been moved from the Supplementary Information into the main manuscript but otherwise, the article is copied here in full.

4.1 ABSTRACT

Violence against women is often studied in the context of violence from intimate partners. However, women receive violence from a wider range of individuals - such as their natal kin - including their siblings, parents, uncles, and cousins. Applying insights from evolutionary theory I examine whether cousin marriage, which has been hypothesised to both reduce the risk of partner violence but increase the risk of natal family violence, associates differently with each type of violence. Secondly, I test whether common risk factors for partner violence, such as wealth, associate similarly with natal family violence. I analyse over 16,000 Jordanian women from 3 cohorts of the Jordan Demographic Health Surveys. Predictor variables include type of cousin marriage (patrilateral or matrilateral), education, wealth, number of children, urban living, and polygyny. Outcome variables include whether a woman's husband or her natal family has ever been physically violent towards her. Being married to a patrilateral cousin but not a matrilateral cousin is associated with a reduced risk of reporting intimate partner violence. By contrast being married to a matrilateral cousin but not a patrilateral one is associated with a reduced risk of reporting natal family violence. As expected, wealth is negatively associated with reporting partner violence, but I find no association with reports of natal family violence. Lastly, individuals with more children are more likely to report IPV. Findings indicate the importance of distinguishing between types of cousin marriage and highlight substantial differences in risk factors for intimate partner compared to natal family violence.

4.2 INTRODUCTION

Violence against women (VAW) is often studied in the context of either intimate partner violence (IPV) or sexual violence by non-intimate partners. However, natal family violence is also common, for example in honour cultures, women may receive violence from their parents, siblings, uncles, and cousins – among others (Gill, 2017). It is not known whether the risk factors for violence from natal kin are similar to those for IPV. Previous literature has highlighted cousin marriage as being protective of IPV (Dyson and Moore, 1983), whereas a separate literature has argued that it may be a risk factor for natal family violence (Tillion, 1983). VAW is less commonly examined from an

evolutionary perspective, which predicts that violence may be indicative of an underlying evolutionary conflict of interest, and generates novel predictions based on evolutionary theory.

When viewed through an evolutionary lens, IPV is considered an outcome of sexual conflict. Sexual conflict occurs when a man can increase his reproductive fitness via a behavioural 'tool', such as IPV, capable of influencing female behaviour, but which comes at a cost to the woman's fitness, or vice versa (Kokko and Jennions, 2014). IPV is often considered a mate guarding behaviour that serves to increase or maintain exclusive sexual access to a woman through preventing female adultery, preventing women from leaving the relationship, increasing sexual access to said woman, and overall increasing her deference to her husband's fitness-relevant objectives (Goetz et al., 2008; Kaighobadi et al., 2008; Stieglitz et al., 2018; Wilson and Daly, 1996). Sexual conflict theory predicts several IPV patterns that are observed: younger women, who are more fertile, are at greater risk (Abramsky et al., 2011); wealthier and more educated individuals - who in the case of men have recourse to other forms of mate retention, such as greater resources, and in the case of women greater bargaining power - are at lower risk (Abramsky et al., 2011); and women married polygynously, who are likely to have higher levels of conflict with their husband and co-wives over resources, are at higher risk (Ahinkorah, 2021). Similarly, cues of infidelity or separation often trigger IPV (Kaighobadi et al., 2008), such as if a husband does not know where their partner is or, where female employment is uncommon and gender segregation common, if women work outside the home or alongside male colleagues (Krishnan et al., 2010).

Cross-culturally women who report IPV have more children (García-Moreno et al., 2005), in line with IPV having fitness relevant outcomes, although important confounders such as age at marriage and socioeconomic status are often not controlled for. However, one study on a horticultural population in Bolivia, found that reporting a major IPV incident was associated with a significantly increased likelihood of birth within the following year, indicating a causal relationship (Stieglitz et al., 2018).

In terms of natal family violence, not much has been said by evolutionary scientists, but there is a recognition within evolutionary theory that there can be conflicts of interest between parents and offspring and between siblings. Parent-offspring conflict (Trivers, 1974) results from a divergence between the fitness-enhancing aims of parents' vis-à-vis their offspring and can lead to violence as a means to mould the behaviour of offspring towards behaviours that maximise parental fitness (Godfray, 1995). Parent-offspring conflict commonly arises over mating preferences, and humans appear to be unique in the animal kingdom in the ability of parents to control or influence the mating of their children (Apostolou, 2007). Parents and offspring may disagree over the relative value of different qualities in a partner. For example, whilst genetic benefits are transmitted only to the offspring of the couple, material benefits that an individual brings to a marriage can be transmitted to affinal kin of their spouse. Thus, it is predicted that on average parents prioritise in a child's partner what will be beneficial for the wider family (Buunk et al., 2008), whereas offspring prefer qualities

associated with genetic quality, such as good looks and physical strength (Perilloux et al., 2011). Furthermore, mothers and fathers, or wider matrikin and patrikin, may also disagree over the value of material versus genetic benefits if material benefits flow unequally to patrikin compared to matrikin (Haig, 2011), which indeed they would in Jordan where groups are structured around patrilineal descent and inheritance (Metz, 1989).

A societal preference for cousin marriage has been hypothesised to be associated with the risk of violence from both intimate partners and natal family. Cousin marriage may be associated with a reduced risk of IPV as women are better acquainted with their husband and more likely to reside near their natal home and be supported by kin (Dyson and Moore, 1983). By contrast, others have argued that cousin marriage is associated with increased violence from natal kin, often in the context of honour-related violence (Kressel et al., 1981; Payton, 2015; Tillion, 1983), which could reflect parent-offspring or sibling conflict over said marriages. Why there might be parent-offspring conflict over cousin marriage has not been examined. Cousin marriages can help consolidate wealth within families (Bahrami-Rad, 2021; Johow et al., 2019) and aid in building tight kinship networks (Kressel, 1986), which may be indispensable in societies where kin support is essential to survival. Cousin marriage also reduces bride price and dowry payments (Bittles and Hamamy, 2010; Mobarak et al., 2018). By contrast, offspring suffer the cost of inbreeding depression (Bener and Mohammad, 2017). Whilst material benefits from cousin marriage are likely to be shared between the couple, parents, and the extended family, genetic costs will be borne heavily by the consanguineous couple. Of course, parents also suffer this genetic cost, as they are related to their grandchildren, but it is unlikely that all offspring of a couple will marry consanguineously. For one, there may be no available age and sex-appropriate cousin for all children to marry a cousin, due to stochastic demographic processes. Secondly, it may be that cousin marriage is a duty that is only required to be performed once. For example, amongst a Kurdish sample, eldest siblings were much more likely to be married to their cousins than younger siblings, indicating that cousin marriage may be a duty to be discharged of at the first opportunity (Payton, 2015). Similarly, known pedigrees from a large Bedouin family in Ramla, Israel, show that not all children marry cousins (Kressel, 1986). Thus, whilst parents suffer the cost of inbreeding depression in one set of grandchildren, this is offset by the fact that their other offspring will likely outbreed, thus allowing parents to reap the material or social benefits of marrying some of their children consanguineously, whilst also reaping the genetic benefits of exogamous marriage in the rest of their children.

Much of the literature does not differentiate between different types of cousin marriage, such as whether it is a patrilateral (on the father's side), matrilateral (on the mother's side), cross (offspring of a parents' opposite sex sibling) or parallel cousin (offspring of a parents' same sex sibling) (Figure 4-1). Evolutionary theory would expect different associations with violence, depending on the type of cousin marriage. For example, behavioural ecologists have argued that women are more at risk of IPV in patrilocal societies, where post-marital residence is with the husband and his relatives, due to women being separated from both female kin, with whom she could form coalitions, but also male

kin who might defend her (Smuts, 1995). However, post-marital residence may change depending on whether one marries consanguineously or not. For example, in a patrilocal system, marrying a matrilateral cousin should lead to a greater distance of dispersal than if you married a patrilateral

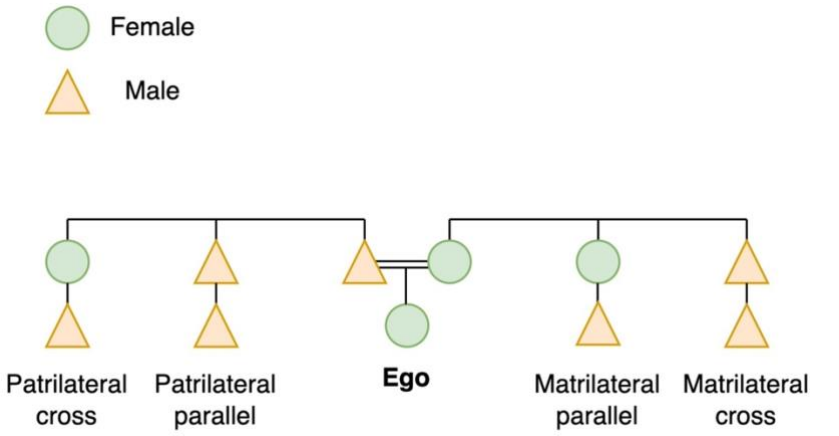


Figure 4-1 Types of cousins in relation to ego

parallel cousin (father's brother's son), as men should be residing close to their brothers, whereas women are less likely to be residing close to their siblings. Thus, we may only see a protective association between cousin marriage and IPV in patrilateral parallel cousin marriages.

Whether there may be increased parent-offspring conflict between different types of cousin marriage has not been examined. It is unlikely that the inbreeding cost will differ on average between ego and the different types of first cousins even if there is a preference for a particular kind of cousin marriage, such as patrilateral parallel cousin marriage, as every individual is a member of both a matriline and a patriline, and their patrilines should carry the same average inbreeding load. However, other costs to daughters of marrying consanguineously may vary between cousin types. In Jordan descent is patrilineal and, at least historically, extended families, households, and clans were broadly structured on blood ties between agnates, with agnatic kin being heavily relied upon for support, whether financial or social (Metz, 1989). The preferred form of marriage in this kinship system, common in Jordan and amongst other Arab populations, is between patrilateral parallel cousins (Hamamy et al., 2005; Korotayev, 2000), as this consolidates patrilineal kin groups and allows inheritance, or any wealth transfers at marriage, to remain within the patriline (Kressel, 1986). With respect to women, this results in them remaining under the control of their male agnates and subordinates their interests to the agnatic group. Costs associated with this may be reduced female autonomy and freedom to make optimal decisions, such as those relating to reproductive timing. For example, consanguineously married couples tend to have more offspring although this is largely explained by earlier age at first birth and faster replacement of infants that have died (Bittles et al., 2002), which likely has a significant physical cost to women. There is also evidence that fertility benefits of consanguineous marriage are offset by reduced fertility in the following generation (Chagnon et al., 2017).

Thus, where there is a preference for patrilateral parallel cousin marriages, one might see the intensity of parent-offspring conflict increase with each passing generation of said cousin marriage, as the

benefits that accrue to parents from wealth and kin network consolidation might increase, whilst the costs to offspring from inbreeding depression and patrilineal control also increase. Additionally, if benefits from cousin marriage are reaped mostly by the patriline then brothers may also have a stronger vested interest in the marriage choices of their siblings, increasing sibling conflict.

The association between cousin marriage and IPV is inconsistent, with some studies finding that cousin marriage is protective (Usta et al., 2015) or that being separated from male kin increases vulnerability to violence (Morse et al., 2012), others that cousin marriage is associated with increased IPV (Mobarak et al., 2018), and some finding no association (Safadi et al., 2018; Shaikh, 2016). Women in focus groups have highlighted that cousin marriages are preferential due to the danger and uncertainty of marrying an unrelated individual (Morse et al., 2012; Shenk et al., 2016). Additionally, consanguineously married women have been found to be more likely to believe that husbands are justified in beating their wives (Yount, 2005), while others find no association (Al-Nsour et al., 2009). In terms of natal family violence cousin marriage was associated with an increased risk of reporting honour-related violence, but only where the marriage was forced or fully arranged (Payton, 2015). Whether these associations change based on the type of cousin marriage is less known.

This paper has two aims. First, I examine whether the risk factors for reported IPV and natal family violence differ, with a particular focus on cousin marriage. Second, I examine whether differences in risk factors fit with predictions derived from evolutionary behavioural ecology. I propose three hypotheses:

1) Women married consanguineously will report less IPV compared to those married to unrelated individuals, and those married patrilaterally will report less IPV than those married matrilaterally.
2) Women married consanguineously will report more natal family violence than those married to unrelated individuals, and those married patrilaterally will report more natal family violence than those married matrilaterally.
3) Women who report violence will have more children.

Additionally, I explore whether individual level risk factors such as education, wealth, and polygyny correlate similarly across both types of violence.

4.3 METHODS

Participants

Data is from the 2007, 2012, and 2017 Jordan Demographic and Health Surveys (DHS) (DHS Program, 2020). The Jordan DHS is stratified by 12 governate regions and between urban and rural areas. One ever-married woman aged 15-49 is selected randomly from each household to complete the domestic violence module. A total of 17,323 women over the 3 cohorts were surveyed in the

domestic violence module. Further information on the sample design can be found in the final reports.

Outcome variables

Women were asked if their current (or last) husband had ever been physically violent towards them. Violence included being pushed, had something thrown at, slapped, punched, hit with something, having their arm twisted or hair pulled, being kicked, dragged, strangled, burnt, and being threatened with a weapon. Secondly, women were asked "from the time you were 15 years old has anyone other than your (last) husband hit, slapped, kicked, or done anything else to hurt you physically?" If yes, respondents were asked who had hurt them in that way, and answers included mother, father, brother, sister. Thirdly, women were asked about whether husbands were ever justified in beating their wives in several situations, including if a wife went out without telling her husband; neglected the children; argued with her husband; disobeyed her husband; or burned the food. Questionnaires can be found in the DHS final reports.

Three binary variables were created. The first relates to violence from a husband and individuals were given a score of 1 if they had reported any form of violence form their husband and a score of 0 if they had not. The second variable relates to violence from related family members whereby individuals were given a score of 1 if they reported violence from a mother, father, sister, or brother and a score of 0 if they did not. No other blood kin members were listed by respondents. The third variable relates to whether they believed violence against women by husbands were ever justified. Individuals were given a score of 1 if they justified a husband's abuse in any of the vignettes (see section 3.1.1 for a full list) and a score of 0 if they thought it was not justified or if they did not know.

Covariates

Socioeconomic status was measured using the DHS derived wealth index and education was measured by the highest level of school the individual attended. Other variables included employment status, total number of children, age at marriage, age at survey, survey year, and whether their husband currently had any other wives besides themselves. Respondents were asked whether they were related to their husband and if so what kind of relation it was. Women were classified as being married to 1) an unrelated individual, 2) a patrilateral cousin, and 3) a matrilateral cousin. Those married to a double first, patrilateral parallel, patrilateral cross or patrilateral second cousin were classified as patrilateral. Those married to a matrilateral parallel, matrilateral cross or matrilateral second cousin were classified as matrilateral. Those married to a more distantly related individual, or an unrelated individual were classified as unrelated. Double first cousins occur when two siblings from one family marry two siblings from another family and the resulting offspring share both sets of grandparents (Fig 4-2). These individuals are related to each other both matrilaterally and patrilaterally but since I am hypothesising that patrilateral marriages are protective of IPV, are classified within the patrilateral group.

A second 7-category variable was created where women were classified as married to 1) a double first cousin who she is related to via both her fathers' brother and her mothers' sister, 2) a double first cousin related via both her fathers' sister and mothers' brother, 3) a patrilateral parallel cousin, 4) all other patrilateral relatives (patrilateral cross-cousin and second cousin), 5) a matrilateral parallel cousin, 6) all other matrilateral relatives (matrilateral cross-cousin and second cousin), and 7) an unrelated individual. 149 individuals who were more distantly related to their husband than second cousins were also classified as unrelated.

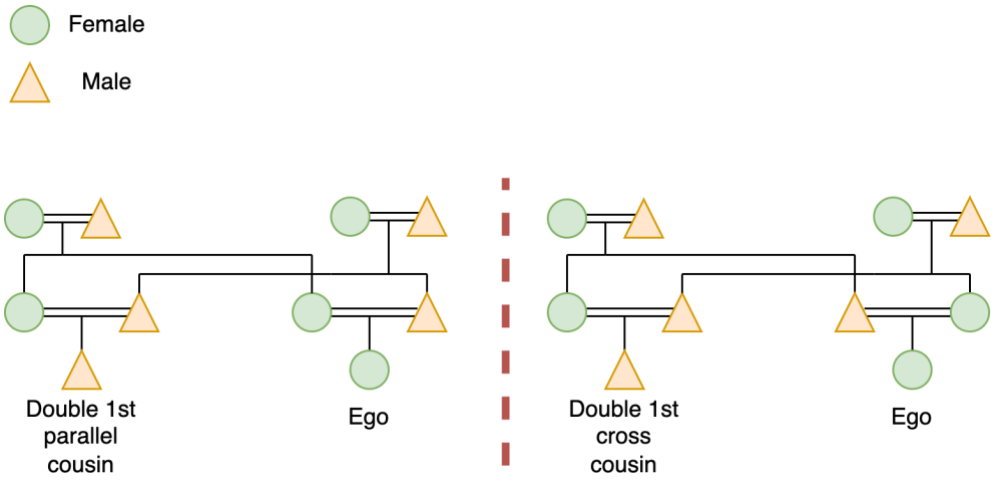


Figure 4-2: Type of double 1st cousin in relation to ego. Double 1st parallel cousins are related via both their father's brother and their mother's sister and result from two same sex siblings marrying another set of same sex siblings. double 1st cross cousins are related via both their father's sister and their mother's brother and result from two opposite sex siblings marrying another set of opposite sex siblings

Analysis

Multi-level logistic regressions with random intercepts for region were used to investigate the difference in associations between covariates and IPV, natal family violence, and justification for violence. These were performed in R (R Core Team, 2021) using the R package lme4 (Bates et al., 2015). Two sets of models were performed. The first set of models contains all covariates including our chief variable of interest: whether an individual is unrelated, related patrilaterally, or related matrilaterally to her husband. Other covariates include whether the respondent is living in an urban or rural area, their wealth quintile, their highest completed education level, whether they are married polygynously, how many children they have, their age at the time of survey, their age at marriage, and the survey year. The second set of models include an interaction term was also included to assess whether the association between cousin marriage and violence differed by survey year. Each set contains three models which differ by outcome variable. The first outcome is whether violence from a husband was reported, the second is whether violence from a natal family member was reported, and the third is whether violence by a husband was justified.

Age at time of survey was controlled for and grand-mean centred to address convergence issues. A DAG containing the hypothesised relationships between the variables is presented in the Appendix

(Appendix A, Figure A1). We present only one DAG as the hypothesised relationships are the same regardless of which violence against women outcome is used. Adjusting for all covariates is an appropriate adjustment set to estimate the direct effect of cousin marriage on violence against women, as tested with DAGitty.net. Univariate analyses between cousin marriage and the two types of violence are presented in the supplementary materials (Appendix A Table A1&A2).

4.4 RESULTS

Between those surveyed in 2007 and 2017 reported IPV declined from 19.60% to 14.83% and reported natal family violence declined from 16.41% to 5% (Table 4-1). Most reported violence from natal family members was perpetrated by male family members with 4.98% and 5.67% of women reporting violence from father's and brothers, respectively, although mothers were also common perpetrators. The percentage of women who thought violence from husbands was justified in at least one case also fell from 76.66% of women to 26.77%.

Table 4-1: Percentage and raw numbers of women who reported violence from husbands and natal family members or justified violence by survey year. *this column is the total % of women who received violence from any natal family member and not the sum of cases

	Violence from husband % (n)	Violence from natal family % (n)					Justification of violence % (n)
		Mother	**Father**	**Sister**	**Brother**	**Any natal family member***	
2007	19.60 (675)	7.14 (246)	6.97 (240)	1.48 (51)	7.26 (250)	16.41 *(565)*	76.66 (2640)
2012	19.44 (1366)	4.50 (316)	6.33 (444)	0.81 (64)	7.98 (560)	15.17 (1065)	44.84 (3151)
2017	14.83 (1016)	1.58 (105)	2.52 (167)	0.20 (13)	2.40 (159)	5.00 (332)	26.77 (1834)
Total	**17.65 (3057)**	**3.90 (667)**	**4.98 (851)**	**0.74 (128)**	**5.67 (969)**	**11.47 (1962)**	**44.02 (7625)**

Of the 34.9% of women who were married consanguineously there is a clear preference for patrilateral relatives, particularly patrilateral parallel cousins and patrilateral second cousins with 8.65% and 7.97% of women being married in this way, respectively (Table 4-2). Consanguinity (second cousin or closer) fell over the three surveys from 42.12% in 2007 to 27.92% in 2017 and the largest declines were in marriages between patrilateral parallel cousins and patrilateral second cousins, which fell by 3.59% and 4.87%, respectively.

Table 4-2: Percentage and raw numbers of women married to a blood relative by consanguinity type and survey year. These numbers are derived from the entire sample of women surveyed, not just those who completed the domestic violence module.

	Double first	Patrilateral parallel	Patrilateral cross	Patrilateral second	Matrilateral parallel	Matrilateral cross	Matrilateral second	Unrelated
2007	4.20 (457)	10.43 (1134)	4.15 (451)	10.35 (1126)	4.94 (537)	3.29 (358)	4.76 (518)	57.88 (6295)
2012	1.52 (172)	9.28 (1054)	4.88 (554)	8.90 (1010)	5.69 (646)	3.37 (382)	3.38 (384)	62.98 (7150)
2017	3.86 (567)	6.84 (1004)	3.04 (446)	5.48 (805)	3.48 (511)	2.48 (364)	2.75 (404)	72.08 (10588)
Total	**3.24 (1196)**	**8.65 (3192)**	**3.93 (1451)**	**7.97 (2941)**	**4.59 (1694)**	**2.99 (1104)**	**3.54 (1306)**	**65.10 (24033)**

Do individuals married consanguineously report less intimate partner violence?

Overall, women married consanguineously were less likely to report IPV, however the magnitude of this association differed depending on whether the husband was related on their father or their mother's side (Fig 4-3, Table 4-3). Being married to a patrilateral relative was significantly associated

with a 14% reduction (OR = 0.86, 95% CI [0.78-0.96]) in reporting IPV, compared to being married to an unrelated individual. Being married to a matrilateral relative was not significantly associated with the likelihood of reporting IPV although it trended in a negative direction (OR = 0.93, 95% CI [0.81-1.06]).

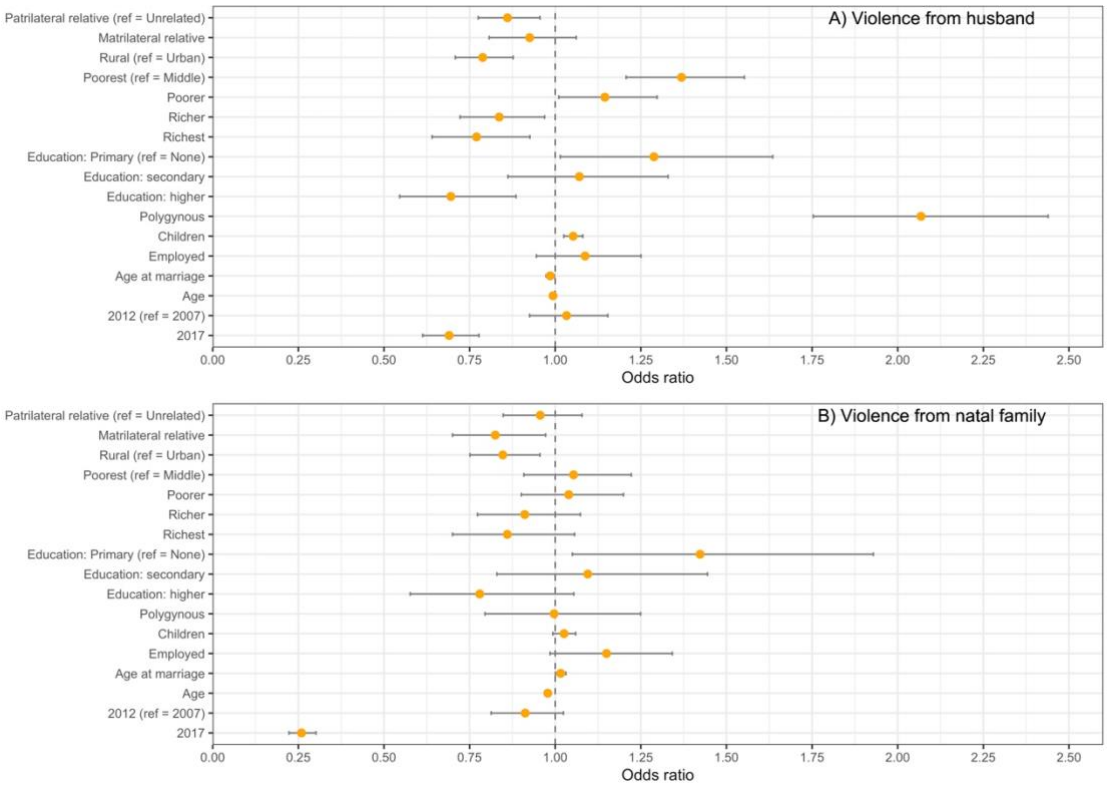


Figure 4-3: Odds ratios and confidence intervals from multi-level logistic regressions of the likelihood of a) reporting violence from a) husband and b) reporting violence from a natal family member, splitting consanguinity into patrilateral and matrilateral relatives

Table 4-3: Odds ratios (OR) and 95% confidence intervals (CI) of multi-level logistic regressions. Model A considers the odds of reporting violence from a husband. model B is the odds of reporting violence from a natal family member and model C is the odds of justifying violence from a husband. ** p<0.05 ** p<0.01 ***p<0.001*

	Model A: Violence from husband OR (95% CI)	**Model B: Violence from natal family OR (95% CI)**	**Model C: Justification of violence OR (95% CI)**
Ref: Unrelated	0.86**	0.96	1.07
Patrilateral relative	(0.78-0.96)	(0.85-1.08)	(0.99-1.17)
Matrilateral relative	0.93	0.82*	1.06
	(0.81-1.06)	(0.70-0.97)	(0.95-1.18)
Ref: Urban	*0.79***	0.85*	0.98
Rural	*(0.71-0.88)*	(0.75-0.96)	(0.90-1.06)
Ref: Middle	*1.37***	1.05	1.38***
Poorest	*(1.21-1.55)*	(0.91-1.22)	(1.25-1.54)
Poorer	*1.15**	1.04	1.18***
	(1.01-1.30)	(0.90-1.20)	(1.07-1.31)
Richer	*0.84**	0.91	0.92
	(0.72-0.97)	(0.77-1.07)	(0.83-1.03)
Richest	*0.77***	0.86	0.67***
	(0.64-0.93)	(0.70-1.06)	(0.59-0.78)
Ref: No education	*1.29**	1.42*	0.84
Primary	*(1.01-1.64)*	(1.05-1.93)	(0.67-1.04)
Secondary	*1.07*	1.09	0.59***
	(0.86-1.33)	(0.83-1.45)	(0.49-0.72)
Higher	*0.70***	0.78	0.41***
	(0.55-0.89)	(0.58-1.05)	(0.33-0.50)
Polygynous	*2.07****	1.00	1.23*
	(1.75-2.44)	(0.79-1.25)	(1.05-1.44)
Children	*1.05****	1.03	1.04***
	(1.03-1.08)	(0.99-1.06)	(1.02-1.07)
Employed	*1.09*	1.15	0.87*
	(0.94-1.25)	(0.98-1.34)	(0.78-0.97)
Age at marriage	*0.99**	1.02*	1.00
	(0.97-1.00)	(1.00-1.03)	(0.99-1.01)
Age	*0.99*	0.98***	0.99***
	(0.99-1.00)	(0.97-0.99)	(0.98-0.99)
Ref: 2007	*1.03*	0.91	0.24***
2012	*(0.93-1.15)*	(0.81-1.02)	(0.22-0.27)
2017	*0.69****	0.26***	0.11***
	(0.61-0.78)	(0.22-0.30)	(0.10-0.12)

Breaking consanguinity down further into its constituent types yielded further differences (Fig 4-3, Appendix A, Table A3). Being married to a double first cousin, where women were related to their husbands via their father's brother (and their mother's sister), or a patrilateral parallel cousin was associated with a 33% (OR = 0.66, 95% CI [0.45-0.98]) and 17% (OR = 0.83, 95% CI [0.71-0.97]) reduction in the odds of reporting IPV compared to unrelated marriages, respectively. By contrast

no other type of cousin marriage was significantly associated with the odds of reporting IPV, compared to unrelated marriages, although all trended in the negative direction.

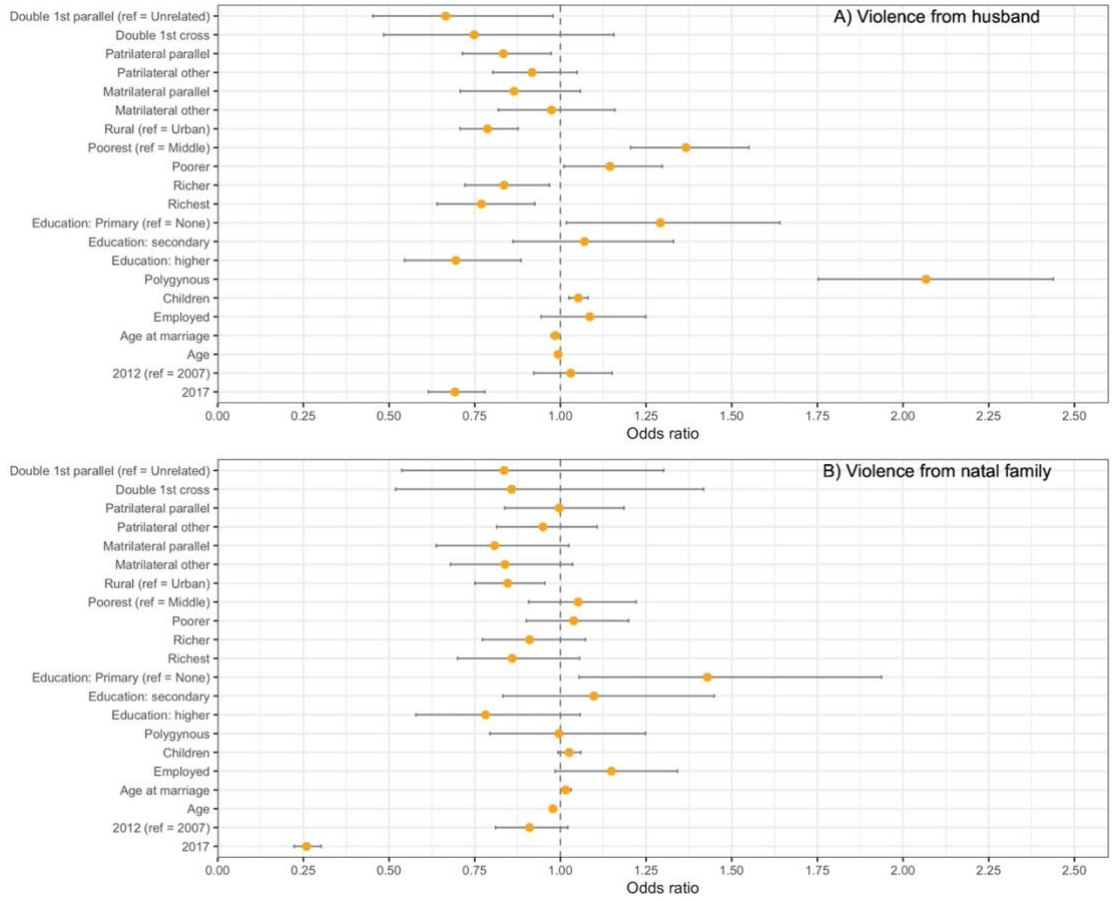


Figure 4-4: Odds ratios and confidence intervals from multi-level logistic regressions of the odds of a) reporting violence from a husband and b) reporting violence from a natal family member, splitting consanguinity down into further constituent types.

Despite consanguinity being associated with a reduced likelihood of reporting IPV, the association with the likelihood of justifying violence from a husband trended in a positive direction (Appendix A Fig A2, Table 3 Model C) and narrowly missed significance for women married to patrilateral relatives (OR = 1.07, 95% CI [0.99 – 1.18]).

Do individuals married consanguineously report more natal family violence?

Individuals married consanguineously were less likely to report natal family violence (Fig 4-3, Table 4-3), although this was only significant for matrilateral cousins who were 18% less likely to report violence (OR = 0.82, 95% CI [0.70-0.97]), compared to those in unrelated marriages. Breaking consanguinity down further for natal family violence yielded no significant associations (Fig 4-4, Appendix A Table A3) although odds ratios for matrilateral marriages were lower than those for patrilateral marriages.

However, introducing an interaction term between type of consanguinity and survey year showed a positive association between patrilateral parallel cousin marriage and both kinds of violence (Appendix A, Table A4), but particularly for natal family violence, for the 2017 cohort (OR = 1.82, 95% CI [1.11-2.97]). In 2017, despite overall reporting less violence, individuals married to said cousin were 68% more likely to report natal family violence and 4% more likely to report IPV, relative to women married to unrelated individuals.

Do women who report violence have more children?

Women with more children were more likely to report IPV; with individuals being 5% more likely (OR = 1.05, 95% CI [1.03-1.08]) to report IPV with each additional child (Fig 4-5) but was not significantly associated with natal family violence. Women married consanguineously also had more children (Appendix A, Fig. A3).

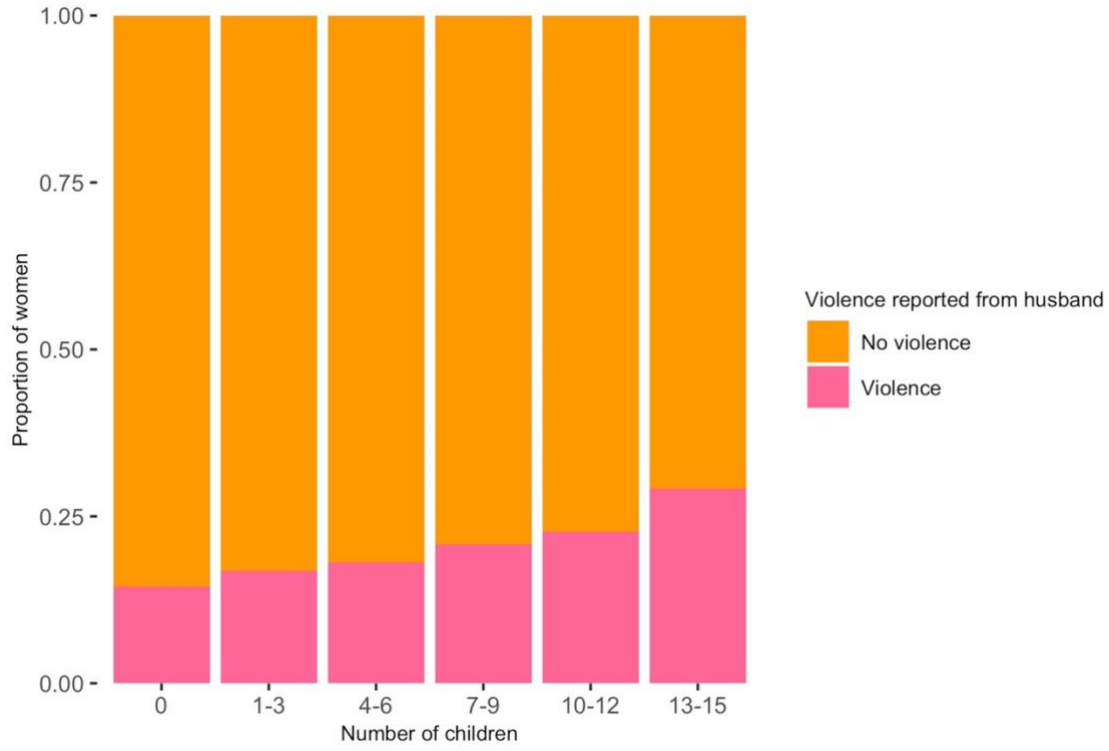


Figure 4-5: Proportion of women who reported violence from their husband grouped by the number of children they have

Do other risk factors differ between IPV and natal family violence?

Associations with rural residence, education, employment, and survey year were similar across IPV and natal family violence (Fig 4-2, Table 4-3). Individuals living in rural areas compared to urban areas were 21% (OR = 0.79, 95% CI [0.71-0.88]) and 15% (OR = 0.85, 95% CI [0.75-0.96]) less likely to report IPV and natal family violence, respectively. Individuals with primary education compared to no education were 29% (OR = 1.29, 95% CI [1.01-1.64]) and 42% (OR = 1.42, 95% CI [1.05-1.93]) more likely to report IPV and natal family violence, respectively. Comparably, women with

higher education were 30% (OR = 0.70, 95% CI [0.55-0.89]) and 22% (OR = 0.78, 95% CI [0.58-1.05]) less likely to report IPV and natal family violence, respectively, although this was not significant for natal family violence. Being employed was not significantly associated with the likelihood of reporting either type of violence although it trended towards a positive association for both. Survey year had a large association with the likelihood of reporting violence, with individuals surveyed in 2017 compared to 2007 being 30% (OR = 0.69, 95% CI [0.61-0.78]) and 74% (OR = 0.26, 95% CI [0.22-0.30]) less likely to report IPV and natal family violence, respectively. Similarly, women surveyed in 2017 were 89% (OR = 0.11, 95% CI [0.10-0.12]) less likely to justify violence from their husbands, compared to women surveyed in 2007 (Appendix A, Figure A2).

Wealth and polygyny associated differently with IPV and natal family violence (Fig 4-2, Table 4-3). Wealth was strongly and significantly negatively associated with reported IPV, with individuals in the poorest quintile being 37% more likely (OR = 1.37, 95% CI [1.21-1.55]) and those in the richest quintile being 23% (OR = 1.23, 95% CI [0.64-0.77]) less likely to report IPV compared with those in the middle quintile. By contrast, although the odds ratios trended in a similar direction wealth was not significantly associated with reported natal family violence. Individuals married polygynously were over twice as likely (OR = 2.07, 95% CI [1.75-2.44]) to report IPV compared to a woman in a monogamous marriage but was not associated with reporting natal family violence.

4.5 Discussion

Being married consanguineously was associated with a reduced likelihood of reporting violence from a husband, but not from a family member, consistent with theory and empirical work showing consanguinity is protective of IPV (Bittles and Hamamy, 2010; Clark et al., 2009; Dyson and Moore, 1983). That women married to their patrilateral relatives had a stronger negative association with IPV supports behavioural ecology predictions that women residing near kin will have greater status. Indeed, it is striking that the only two subtypes of cousin marriage that were statistically significantly associated with IPV was the double first parallel cousin marriage, that means women are related to their husbands through their father's brother, and a patrilateral parallel cousin marriage. These are the two types which, if post-marital residence is with the husband's family, should result in the woman residing near her patrilateral male kin, particularly members of her father's patrilineage. Indeed, in focus groups in Jordan women highlighted being separated from their male kin as a contributing factor to their risk of IPV (Morse et al., 2012).

It is also possible that women in consanguineous unions are less likely to report IPV, either because they are more likely to engage in conflict avoidance strategies, or because of potentially higher repercussions of damaging the family dynamic were their indiscretion to be revealed. Qualitative research in Egypt, Pakistan and Bangladesh has shown that women married to their relatives felt obligated to tolerate higher levels of mistreatment than women married to unrelated individuals, due to the risk of damaging relationships with kin (Hussain, 1999; Shenk et al., 2016; Yount, 2005). In

Bangladesh women agreed that patrilateral parallel cousin marriages were particularly tense whereas matrilateral parallel cousins were preferential, due to relations between sisters being more relaxed than those between brothers. Sisters often reside in different places and have no common property to argue over, whereas disputes about inheritance in the patrilineage are common (Shenk et al., 2016). Women also expressed the desire to marry unrelated individuals and be less dependent on kin who might make unreasonable demands, particularly patrilineal kin (Shenk et al., 2016). Whilst not statistically significant, the association between consanguinity and justification of husband violence trended in a positive direction, particularly for patrilateral parallel cousins, somewhat consistent with trends found in Egypt (Yount, 2005) and suggestive of more conservative values around gender equality within consanguineous marriages.

That being married to a relative was *not* associated with an increased risk of reporting violence from natal family members compared to unrelated married couples, does not support the hypothesis that cousin marriage in general produces high levels of parent-offspring conflict. However, I do find some evidence of possible variation in parent-offspring conflict between types of cousin marriage, with those married to a matrilateral cousin being significantly less likely to report natal family violence, whereas being married to a patrilateral parallel cousin carried the same risk of reporting natal family violence as being married to an unrelated individual. If natal family violence does capture some degree of parent-offspring or sibling conflict over marriage, then this result indicates that matrilateral cousins may be the preferred marriage partner by offspring, whereas patrilateral parallel cousins and unrelated individuals are the least desired. As discussed, it may be that in societies with a longstanding preference for patrilateral parallel cousin marriage, parent-offspring conflict is more intense due to a ratcheting effect over generations of both the benefits that accrue to parents and wider kin, but particularly the costs that offspring suffer.

In Jordan, whilst many couples become somewhat acquainted independently of family, most marriages are in some respects arranged, and how long couples are allowed to get to know each other for varies greatly (Adely, 2016; Hamamy et al., 2007; Khoury and Massad, 1992). Often women have more interaction with their extended kin due to the limited number of respectable places that unrelated men and women can meet, although this is changing rapidly through changes to society, such as increasing numbers of Jordanian women going into higher education (Adely, 2016). In Bangladesh, the rise in 'love marriages' that are replacing more strictly arranged marriages has contributed to an increase in matrilateral cousin marriage, which appears to be the preferred choice given the available pool of men that women interact with (Shenk et al., 2016). Thus, while marrying a patrilateral parallel cousin may carry higher risks of inbreeding depression and result in women being reliant on and controlled by their male relatives, marrying an unrelated individual can also be risky as couples are usually less well acquainted, marriage negotiations can be more complicated, and the bride may be less well treated by her in-laws (Bittles and Hamamy, 2010; Hussain, 1999; Mobarak et al., 2018; Ottenheimer, 1986), leaving matrilateral cousins as the most desired balance of risks.

That individuals surveyed in 2017 were much less likely to report both forms of violence and to justify violence indicates that norms around violence have shifted considerably since 2007. In 2017 and 2018 a number of legal changes were made, including the repealing of Article 340 of the penal code of Jordan that allowed reduced sentences for men who murdered their female relatives on the basis of them committing adultery (Husseini, 2021). This normative change around women's rights could lead to particularly tense parent-offspring conflict around marriages deemed more conservative by young people, such as patrilateral cousin marriages. If so, we would expect the association between patrilateral parallel cousin marriage and natal family violence to differ by survey year. Indeed, introducing an interaction term between survey year and type of cousin marriage indicated that within the 2017 sample patrilateral parallel cousin marriage is positively associated with risk of natal family violence relative to unrelated marriage.

Having more children was associated with increased risk of reporting IPV consistent with the hypothesis that IPV increases reproductive success potentially through increasing sexual access to a wife or reducing the age at first birth (García-Moreno et al., 2005; Stieglitz et al., 2018). It is well known that men often express less desire to limit childbearing, as is the case for Jordan (DHS Program, 2020). To my knowledge this is one of the first studies to document an association between IPV and number of offspring in a non-natural fertility population whilst also controlling for major confounders like wealth, education, and age at marriage.

Polygyny was found to be a strong predictor of IPV, consistent with other literature (Ahinkorah, 2021). Polygyny can be the outcome of sexual conflict where males benefit reproductively from polygyny whereas women suffer a cost, such as lower fertility or higher child mortality, as has been found in the Dogon of Mali (Strassmann, 1997). Additionally, competition and conflict between co-wives and wives and husbands over resources can lead to violence (Heath et al., 2020).

Increased wealth was associated with reduced odds of reporting IPV, consistent with most other literature (Stöckl et al., 2021). Interestingly however, wealth was not significantly associated with natal family violence. If natal family violence reflects parent-offspring conflict over marriage, or female behaviour in general, then one would expect violence against women to occur irrespective of family wealth as wealthy families also control the behaviour of their female kin – indeed the reputational costs for wealthy families may be greater. Furthermore, primary education was associated with increased risk of both forms of violence perhaps implying that violence is used to reassert dominance against the growing independence of educated women, also reflected by women being less likely to justify violence the more educated they are. This trend reverses with higher education, indicating that there could be a U-shaped relationship between violence against women and education (or female emancipation generally), with women receiving less violence at very low and very high levels of education.

Limitations

Firstly, the variables on violence are self-reported and likely underestimate the real rate of violence. Certain groups may underreport more, for example consanguineously married women may report less violence due to fear of upsetting tightly knit kin groups. Similarly, richer women may also be less willing to report violence, perhaps due to increased social stigma due to higher pressure to maintain an appearance of high-status, or due to risk of losing access to wealth. Secondly, the data is cross-sectional in nature, results are correlational and causal inferences cannot be drawn. Thirdly, I interpret natal family violence as a proxy of parent-offspring or sibling conflict over marriage, but it is unknown to what degree the violence is related to this conflict. Fourth, patrilocality is assumed but not measured. Whilst historically post-marital residence was patrilocal, nowadays most Jordanians live in nuclear households (Clark et al., 2010), although it is likely a fair assumption that couples still tend to live closer to, or in the same area as, the husband's family. Indeed, when couples do live in the same building or house as extended family it is with the husband's (Clark et al., 2010).

Implications

Taking an evolutionary approach theorises domestic violence in terms of the different costs and benefits associated with marriage and reproduction to different family members, and hence how conflicts of interest within the family may arise. This approach helps to frame our understanding of different risk factors that are associated with violence from husbands and natal family violence against women and girls. Violence from husbands is associated with determinants of fertility, including age and poverty, as well as the extent to which women are supported by their kin; whereas violence from natal family members is more associated with different kin-based marriage rules, where kin-based marriage may be associated with costs of inbreeding and benefits of families ties and inheritance rules, but where costs associated with attempts to violate kinship norms may often be associated with honour-related violence.

CHAPTER 5: CONSANGUINITY AS A DRIVER OF HONOUR-BASED VIOLENCE

The results presented in this chapter have been submitted to Proceedings B and are awaiting editorial decision. The chapter is co-authored by Grégory Fiori, Cecilia Padilla-Iglesias, and Ruth Mace. G.F. coded and calculated the KII. C.P.I calculated the runs of homozygosity. C.P.I and R.M provided feedback on the manuscript. This chapter contains one additional analysis examining whether there is a relationship between female inheritance, pastoralism, and honour, which is not included in the manuscript that has been submitted to Proceedings B.

5.1 ABSTRACT

Honour-based violence, prevalent in honour cultures and often directed at women, is a serious global health issue. It has been noted that honour cultures typically occur where the rule of law is weak and where groups have a preference towards cousin marriage and intensive kinship. Here I test a hypothesis that cousin marriage, as one aspect of intensive kinship, is associated with the emergence of honour cultures. Using the average genomic inbreeding coefficient of an ethnic group, as a measure of the historical practice of cousin marriage, I show some of the first empirical evidence that this is associated with the likelihood of justifying honour killings against women but not men across 52 ethnic groups, and that this association also holds between regions within countries using data on the number of women employed outside the home and the number of women who would justify violence if they went out without telling their husbands.

5.2 INTRODUCTION

Honour-based violence (HBV), often directed at women, is a global health issue with an estimated 5000 women and girls being murdered every year in the name of honour (UNFPA, 2000). Honour cultures are characterised by the belief that individuals must respond to threats to their honour with violence (Cohen, 2007). These cultures often contain strong norms of reciprocity and retribution, and the value of honour determines who has social capital within the community. Examples of features of honour cultures include Albanian blood feuds and the Italian vendetta system, which require individuals to murder those who have dishonoured their family; gang culture, where individuals avenge their fellow gang members; the gendered honour codes of sharaf and ird amongst the Bedouins, where sharaf (male honour) can be lost and regained whereas ird (female honour) can only be lost; and caste-based honour killings in India, where women or couples are murdered for engaging in inter-caste marriage. Whilst many of these examples highlight revenge, the extent to which this vengeance and associated violence is directed towards men compared to women varies.

In many countries of North Africa, the Greater Middle East and Central and South Asia from Morocco through to Pakistan, honour is maintained and embodied within women (Gill et al., 2014). These cultures, which are the focus of this study, often place an extreme emphasis on female virginity and contain numerous regulations related to female behaviour and marriage leading some to describe this region as the patriarchal belt (Kandiyoti, 1988). Honour-based controls in these cultures can take various forms, including limitations on female movement, veiling, the requirement of male chaperones, gender segregation, female claustration, emotional violence, physical violence, and honour killings (Gill et al., 2014). Honour killings, the murder of a woman who is perceived to have brought dishonour to her family, represent the most extreme form of honour-based violence.

Victims of honour killings are typically young women and follow an accusation of sexual impropriety, such as refusing an arranged marriage, pre-marital sex, adultery, or more minor transgressions such as interacting with unrelated men. This dishonours her family who are subsequently ostracised by the community until their honour is restored through an honour killing. Male victims of honour killings do occur in certain circumstances, such as in the event of an inter-caste marriage, where he is often murdered alongside the woman (D'Lima et al., 2020), following the disclosure of homosexuality (Khan and Lowe, 2019), and during elopements (Kressel et al., 1981). The perpetrators of honour killings are typically male and are often the victim's agnates, such as her brothers, uncles, or father (D'Lima et al., 2020; Kressel et al., 1981; Kulwicki, 2002). It is this characteristic, that honour killings are perpetrated by blood kin, that differentiates them from honour-related murders in other parts of the world, such as Albanian blood feuds, which occur between families and where perpetrator and victim tend to be unrelated.

Whilst the occurrence of honour killings is well known, attempts to explain cross-cultural variation in their incidence are scarce. Here I test a hypothesis that cousin marriage, as one aspect of intensive kinship, is associated with honour cultures. That population structure can underpin cultural traits is not new and ecological and demographic factors such as subsistence type, dispersal at marriage, and kinship intensity have been shown to explain variation in marriage practices (Hartung, 1982), workload (Chen et al., 2023) and global psychological variation (Schulz et al., 2019), respectively.

The rationale behind the association between cousin marriage and intensive kinship and honour cultures has been theorised. On the one hand, it might be expected that staying with your close kin increases cooperation within families due to both high relatedness (Croft et al., 2021; Hamilton, 1964c; Taylor, 1992a) and potentially increased bargaining power (Chen et al., 2023). These hypotheses predict that staying with close kin could protect women from violence from family members, thus predicting a negative relationship between consanguinity and honour-based violence. On the other hand, cousin marriage might increase parent-offspring conflict over marriage choices, leading to the emergence of an honour culture, with its many proscriptions around marriage and sex, as a way of enforcing marriage choices among offspring.

What might parents and offspring be in conflict about? One theory posits that in patrilineal societies, where females inherit some of the patrimony, families may engage in cousin marriage as a means to keep wealth within the family (Tillion, 1983). Indeed female inheritance and cousin marriage are associated cross-culturally (Korotayev, 2000) and recent evidence from India indicates that the introduction of a legal amendment that meant that daughters were now legally entitled to inherit led to an increase in cousin marriage (Bahrami-Rad, 2021). Cousin marriages also tend to have reduced or no bride price or dowry, simplifying negotiations financially and frequently named as a chief reason for cousin marriage (Aswad, 1971; Bittles and Hamamy, 2010; Kressel, 1986; Mobarak et al., 2018). Another line of research proposes that honour-based cultures may arise from a history of pastoralism, as pastoralists are particularly vulnerable to raiding and local warfare, and may develop a culture of revenge to protect themselves (Cao et al., 2021; Nisbett and Cohen, 1996). In addition, cousin marriage, particularly of the patrilateral parallel type common to the MENA region, where daughters marry their father's brother's son, will consolidate the patrilineal group through reinforcing agnatic bonds. Cousin marriage increases group relatedness that benefits pastoral nomadic groups, who are required to collectively make decisions on issues such as warfare and migration (Keddie, 1990). Some have also argued that pastoralists in the Arabic peninsula and Middle East experienced constant low-level warfare to which the best defence was binding brothers together through cousin marriage (Barth, 1986; Murphy and Kasdan, 1959; Robertson Smith, 1885).

By contrast offspring suffer the costs associated with marrying close kin, such as genetic disorders and higher infant mortality, which will increase with each additional generation of cousin marriage (Bener and Mohammad, 2017; Dalzero et al., 2023). Of course, parents also suffer this cost to their reproductive success as they are related to their grandchildren. However, there may be asymmetries in costs and benefits since parents consider the summed costs and benefits to all their children. For example, whilst one child may marry a cousin, their other children may not, allowing parents to reap both the material and political benefits of marrying some of their children consanguineously, whilst avoiding the costs of inbreeding depression in others. Furthermore, parent-offspring conflict may be sex-biased if the costs or benefits of cousin marriage flow predominantly to one sex. For example, this can occur if men are able to marry polygynously having both related and unrelated wives, if brothers gain fitness benefits from their sisters marrying relatives through marriage exchanges, and if it allows males to marry a younger women or avoid a shortage of mates (Aswad, 1971; Chagnon et al., 2017; Dalzero et al., 2023).

There is speculative evidence suggesting that the preference for cousin marriage and intensive kinship may be associated with honour-based violence. Modelling has shown that honour cultures emerge where the rule of law is weak and the environment is tough (Nowak et al., 2016). These societies are often characterised by intensive kinship systems, where cooperation occurs within tight knit social networks containing many kin, rather than with strangers, often resulting from norms of cousin marriage (Nisbett and Cohen, 1996; Tillion, 1983). In contrast, extensive kinship systems - where honour cultures are thought to be rare - feature low within-group relatedness and wider kinship

networks, resulting from the marriage of unrelated and geographically distant individuals (Walker and Bailey, 2014). At the individual level, cousin marriage is associated with being at risk of honour-based violence (Payton, 2015) although there may be variation in this risk depending on the type of cousin (Campbell and Mace, 2022).

Using a variety of data sources, including a genetic measure of cousin marriage rarely used in the social science literature, I show that cousin marriage is associated with honour-based beliefs at two levels: 1) across ethnicities and 2) between regions within countries. I also test whether female inheritance and pastoralism are associated with honour beliefs, since both are thought to cause cousin marriage.

5.3 METHODS 1

Analysis 1: Attitudes towards honour killings and genetic measures of consanguinity.

To examine cross-cultural variation in honour-based beliefs and practices, I combine multiple large datasets to perform three separate analyses. First, I utilise survey data, collected between 2011 and 2012, from a Muslim only sample on attitudes towards honour killings from the Pew Research Centre (Pew Research Centre, 2013) (See section 2.1.3 for details). Respondents were asked to indicate their level of agreement with the statement: "Some people think that if a woman engages in premarital sex or adultery, it is justified for family members to end her life in order to protect the family's honour. Others believe that this practice is not justified, no matter the circumstances. Do you personally feel that this practice is often justified to defend the family honour, sometimes justified, rarely justified, or never justified?" The same question was repeated with reference to an honour killing against a man. In three countries – Afghanistan, Iraq, and Uzbekistan – the wording of the question was slightly altered by removing references to premarital sex or adultery and replacing them with "brings dishonour to the family", due to sensitivities in these countries. As such, respondents from these countries were given a more general question in which they had to infer what constituted dishonour. Individuals were given a score of 1 if they believed violence was often or sometimes justified and a score of 0 if they believed it was rarely or never justified, or if they did not know.

Respondents also reported their ethnicity, their education level, their religiosity, their sex, whether they lived in an urban or rural area, and their age. Respondents from each country had different response types for education level depending on the educational structure. For example, respondents from Albania were able to select whether they had completed less than four grades, four grades, lower secondary, upper secondary, or any higher education. Other countries had a different breakdown of educational levels. In order to make respondents comparable this variable was transformed for each country into 4 categories: no education, some or all of primary, some or all of secondary, and some or all of higher. Religiosity was assessed by asking respondents "on average, how often do you attend the mosque for salah and Jum'ah Prayer?". Categorical responses included: never, seldom, a few times a year, especially for the Eid, once or twice a month, once a week, and more than once a week. Sex

was coded as either male or female and place of residence as either urban or rural. Age was categorised into 7-year age groups: 18-25, 26-33, 34-41, 42-49, 50-57, 58-65, 66-74, 75+. Any individuals who responded that they didn't know or refused to answer were coded as missing for all variables and were not included in the analyses.

Calculating runs of homozygosity (ROH)

Second, I calculate population-level average genomic inbreeding coefficients (F_{ROH}) using genome-wide single nucleotide polymorphism (SNP) data from the publicly available Human Origins dataset described in Lazaridis et al. (2014). It is a standard genetic panel that was built for the purpose of between population comparisons. Runs of homozygosity (ROH) are regions of the genome where an individual is homozygous across all sites due to common ancestry between said individuals' parents. They are currently the best and most well-established genetic means of detecting parental relatedness and consanguinity (see Broman and Weber, 1999 for the first study showing the prevalence of runs of homozygosity and Ceballos et al., 2018 for a detailed review of their relationship to consanguineous marriage). Prior to genetics, inbreeding coefficients were calculated using detailed pedigree data, but these are hampered by two factors: 1) detailed pedigree data that goes back several generations is very rare and 2) pedigree calculated inbreeding is the expectation for a given individual when in reality there is significant variation in the actual proportion of the genome that is identical by descent. Genetic measures gives us the realised homozygosity while also associating strongly with known pedigrees (Ceballos et al., 2018; Kirin et al., 2010; McQuillan et al., 2008; Ringbauer et al., 2021).

I calculate the mean F_{ROH} per population (hereafter referred to as mean F_{ROH}) by averaging the F_{ROH} estimates of the individuals within each population. One potential issue is the extent to which mean F_{ROH} is a robust measure of the group, which may be affected by number of individuals sampled and geographic location of the samples. The number of individuals sampled per population varies from 6-56 and many of the samples are drawn from a single location and therefore do not cover the geographic range of a population (see table B1 for sample sizes and location of samples). However, the Human Origins panel is a standard genetic panel that was built for the purpose of between population comparisons and many researchers have previously used the Human Origins panel to infer population history, including consanguinity (Ringbauer et al., 2021).

ROH and their lengths were analysed using published methods (Ceballos et al., 2018; Clark et al., 2019; Joshi et al., 2015). Continuous ROH SNPs in autosomal chromosomes were identified using PLINK with the following parameters: *homozyg-window-snp 50; homozyg-snp 50; homozyg-gap 1000; homozyg-density 50; homozyg-window-missing 5; homozyg-window-het 1*. These parameters have been previously shown to call ROH that correspond to autozygous segments in which all SNPs (including those not present on the chip) are homozygous-by-descent instead of chance arrangements of independent homozygous SNPs (McQuillan et al., 2008). Moreover, inbreeding coefficient (F_{ROH})

estimates calculated by this method have been shown to correlate well with pedigree-based estimates as well as be robust to array choice (McQuillan et al., 2008).

After identifying ROH in each individual, I then created several different datasets by varying the minimum length of ROH used to calculate inbreeding coefficients. These ranged from ROH > 0.5Mb to ROH >10Mb. The principal analyses use ROH >1.5Mb. This is because longer ROH (generally >1.5Mb) are seen as evidence of recent parental relatedness, such as that which is produced by cousin marriage, whilst shorter runs are thought to reflect the demographic history of populations (in particular, recent population bottlenecks) (Ceballos et al., 2018; Clark et al., 2019; Kirin et al., 2010)). By varying the cut off length of ROH that we measure we can differentiate between the different demographic origins of ROH and test at which point our associations are strongest, with longer runs being indicative of more recent cousin marriage events. However, long runs can also be produced by other causes of recent parental relatedness, such as small population size and within population endogamy. The long ROH found in indigenous populations such as Native Americans, who can harbour ROH of longer than 5Mb, are likely to have been produced by isolation, rather than cousin marriage, given that few Native American groups practise the latter (Kirby et al., 2016; Pemberton et al., 2012). Therefore, while I cannot definitively say that all long ROH are produced by cousin marriage, it is well documented that many long ROH are reflective of this practise, given the strong correlations found between ROH and known pedigrees (Ceballos et al., 2018; Kirin et al., 2010; McQuillan et al., 2008; Ringbauer et al., 2021), and that populations known to have high rates of cousin marriage are enriched for long ROH (Pemberton et al., 2012). (See Appendix B Figure B1 & B2 for the box plots showing the distribution of ROH of three different lengths in each population used in the analysis).

Inbreeding coefficients were calculated for each individual as follows:

$$F_{ROH} = \frac{L_{ROH}}{L_{AUT}}$$

Where L_{ROH} is the total length of an individual's genome in ROH of the specified minimum length. Since all individuals are genotyped with the Human Origins Affymetrix array (i.e. the same array), L_{AUT}, that is, the total length of the autosomal genome, was calculated as the length between the first SNP and the last SNP per chromosome for all autosomal chromosomes (in base pairs). Then, I calculated mean F_{ROH} per population (Henceforth mean F_{ROH}) for each ROH length category by averaging the F_{ROH} estimates of the individuals comprising it.

Mean F_{ROH} can be considered as an estimate of total inbreeding relative to an unknown base generation, approximately tens of generations past (Clark et al. 2019). This allows us to capture the amount of cousin marriage that has occurred over many generations rather than using contemporary survey data that often captures only 1-2 generations. This is important given that rates of cousin marriage fluctuate through time depending on other factors such as wealth and urbanisation. Whilst both $F_{ROH>1.5}$ and $F_{ROH>5}$ have been shown to correlate strongly with inbreeding coefficients from

known pedigrees, it has also been shown that demonstrably outbred individuals, for at least 10 generations, can harbour ROH of up to 4Mb in length but no longer (McQuillan et al., 2008). I report results for $F_{ROH>1.5}$ in the main manuscript as well as reporting additional results for a wide range of F_{ROH} levels from >0.5Mb to >10Mb to firstly, show that the results are robust to a more extreme lengths of ROH (and thus stronger evidence for consanguinity) and secondly, to investigate what level of ROH has the strongest association with the outcome of interest.

Matching genetic populations to self-reported ethnic groups

I match the mean F_{ROH} of the genetic populations to the ethnicities reported in the survey data. Ethnic groups with fewer than 10 respondents are removed from the dataset. Exact matches are those where the ethnicity name and the name given to the genetic population are the same or ethnonyms. For example, Pashtun and Pushto are matched to Pathan as these are considered alternate names for the same ethnic group. Where there was no exact genetic match for a self-declared ethnicity, the closest possible match was used. This was decided using information from eHRAF, D-PLACE, Glottolog, Joshua Project, and other academic sources, and selecting the genetic group that was most ethnically, geographically, and linguistically similar (see Chapter 3 for more detail on these sources). When selecting an imperfect match, it was ensured that both groups had similar kinship and marriage practices and a group that was linguistically close would not be chosen if marriage practises were different. Occasionally, no appropriate proxy match could be found for a self-reported ethnicity due to limited information on the marriage and kinship practices of the ethnic group. Twice, an average was made between the F_{ROH} of multiple groups. For example, Kurds predominantly live in Turkey, Iran, Iraq, and Syria and speak Kurdish, which is closely related to Persian. The F_{ROH} matched with Kurd was an average of the F_{ROH} for Turkish, Iranian, and Syrian (there is no genetic data for Iraqis). I obtained exact matches for 27 ethnic groups and imperfect matches for a further 25 ethnicities, resulting in a total sample of 52 ethnic groups from 25 countries. See Appendix B Table B1 for a full list of matches.

Calculating the Kinship Intensity Index

Previous research has also demonstrated associations between an omnibus measure of kinship intensity called the Kinship Intensity Index (KII) and global psychological variation and economic or political development (Bahrami-Rad et al., 2022; Schulz, 2022; Schulz et al., 2019). I calculate the KII for each ethnicity using data from D-PLACE (Kirby et al., 2016). The KII is calculated using categorical variables on cousin marriage preference, polygamy, co-residence of extended families, lineage organisation, and community organisation from D-PLACE. Each sub-variable is given a score between 0 and 2 depending on its hypothesised effect on kinship intensity, with higher scores indicating higher intensity. A mean across these sub-scores is calculated for each group and these means are then standardised to create a relative index of kinship intensity. Where data on the sub-variables that make up the KII were missing in D-PLACE I used information from eHRAF. Detailed information on how the KII is calculated can be found in Appendix B and in Schulz et al 2019.

Matching populations from D-PLACE to self-reported ethnic groups

Most self-reported ethnicities were able to be matched exactly to a society in D-PLACE. Where there was no exact match between a self-reported ethnicity and society in D-PLACE, the closest possible match was used. As before, this was determined via the closest group linguistically and geographically that also had similar marriage practises. Overall, I made 45 matches of which 10 use proxy groups and 3 are averages of multiple groups. For example, the data contained Berber respondents from Morocco and in D-PLACE there are 4 Moroccan Berber groups which were averaged to create a single KII score for Moroccan Berbers. The list of matches is available in Appendix B Table B2. I repeat the analyses using the KII to demonstrate that when comparing societies that are closely related the KII is unable to capture much variation in kinship intensity. Fine-grained measures, such as genetics, are necessary to truly understand any association between kinship intensity and outcomes of interest.

Other covariates

Language Family is coded using Glottolog, which lists the major language family for all languages. GDP is taken from the Penn World Table for the year 2012. Variable EA042 from D-PLACE was used to code whether an ethnic group subsisted mostly off pastoralism. Whether an ethnic group had female inheritance was coded using variables EA074 and EA076 referring to the inheritance of moveable wealth and land, respectively. Ethnic groups were given a score of 1 if they were recorded as having either type of inheritance. Variable EA023 was used to code whether an ethnic group permitted cousin marriage or not. Ethnic groups were given a score of 0 if they were recorded as having no first or second cousin marriage, and a score of 1 if they permitted any other type of cousin marriage. If cousin marriage data for an ethnic group was unavailable in D-PLACE then this was manually coded using information from the Human Relation Area Files or else from other academic sources.

Analysis

In order to analyse the association between F_{ROH} and the likelihood of justifying an honour killing I fit a multi-level logistic regression model in R (R Core Team, 2021) using the R package lme4 (Bates et al., 2015). Random intercepts for ethnic groups are modelled to account for the hierarchical structure in the data and to allow me to investigate the association of an ethnic-level predictor on an individual-level outcome, without removing variation at the individual level. The outcome variable is whether an individual thought that an honour killing was justified. Individuals were given a score of 1 if they believed violence was often or sometimes justified and a score of 0 if they believed it was rarely or never justified, or if they did not know. Two sets of models were fit depending on whether the outcome variable related to honour killings against a man or a woman. Ethnic groups with fewer than 10 respondents are removed from the dataset. 5 models are presented per set with each model

containing different variations of covariates. Model 1 contains only the predictor variable $F_{ROH.>1.5.}$ Model 2 includes GDP and individual level controls including: the sex of respondents, age group, education level, urban/rural living, and religiosity as controls. GDP is standardised to ameliorate convergence issues due to the different scales of covariates. Model 3 includes language family as an additional random effect. Model 4 includes an additional predictor variable of whether an ethnic group is reported to practise cousin marriage but does not include language family. Model 5 includes all covariates.

We include individual level controls of sex, religiosity, education, and rural residence as they may confound a relationship between $F_{ROH.}$ and justification of honour killings. For example higher levels of education are associated with lower levels of cousin marriage and tend also to be associated with lower levels of violence against women (Bittles and Black, 2010b; Campbell and Mace, 2022). Distributions of these individual level characteristics may well differ between ethnic groups, such as if some ethnic groups have higher levels of formal education or are more religious than others, and therefore may well have an effect on the mean F_{ROH}.

The rationale for controlling for language family through a random effect is as follows. Cross-cultural analyses are complicated by the fact that ethnic groups are not statistically independent but instead have a shared cultural history. Instead, correlations between traits of ethnic groups are often confounded by cultural ancestry, whereby the correlation reflects a shared ancestral origin (Claessens et al., 2023). One means of controlling for shared cultural history is through including random effects for language families – a method commonly used across the social sciences (Currie and Mace, 2009).

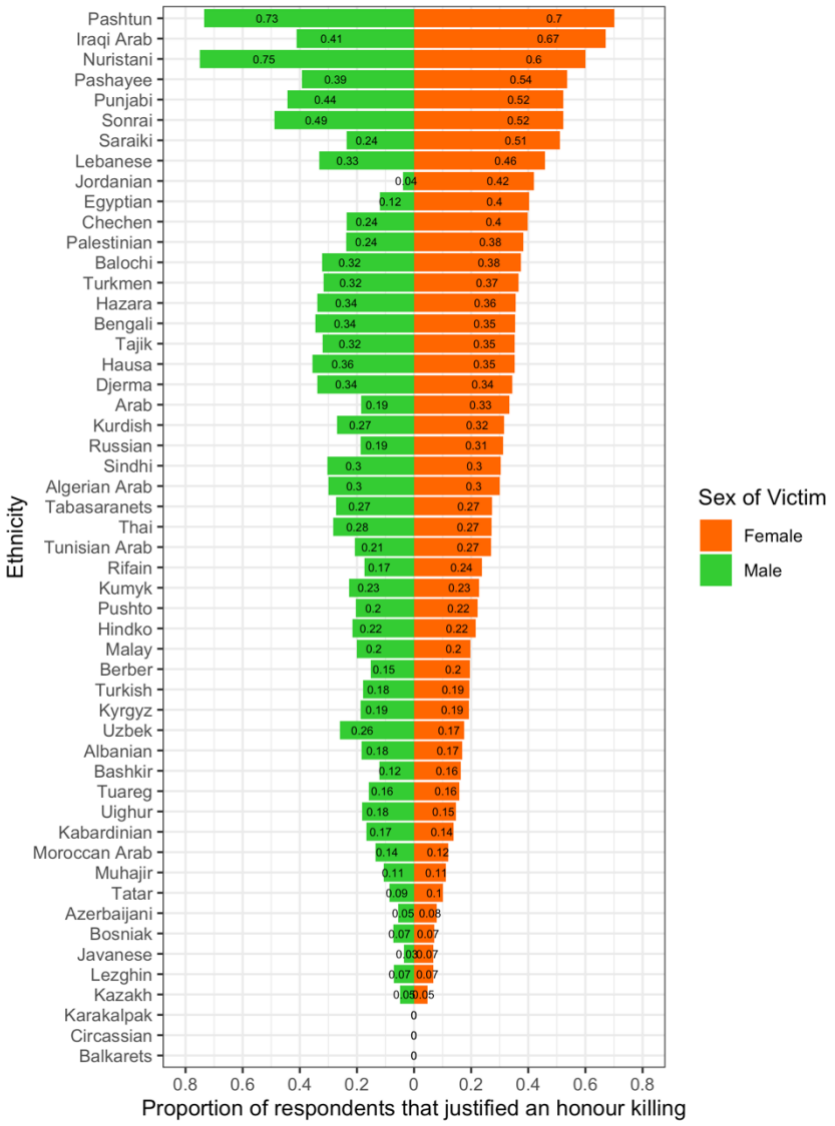
5.4 RESULTS 1

Higher inbreeding coefficients explain honour-based violence across ethnicities.

Figure 5-1 presents the proportion of individuals that justified an honour killing against men and women for each ethnicity. Whilst some groups, like Karakalpaks, Balkarets, and Circassions never justify honour killings against men or women, in others the majority think it is justified. Additionally, the relative proportion of respondents who justify honour killings against each sex varies, with some, like Jordanians, believing that it is considerably more justified to murder a woman than a man. While in others, like Pashtuns and Nuristanis, more respondents believe it to be justified against a man.

Justification of honour-based violence is generally strongly positively associated with $F_{ROH>1.5}$ at the ethnicity level. Figure 2 illustrates this, showing a Pearson correlation (R) of 0.46 (95% CI 0.21 - 0.65) and 0.39 (95% CI 0.13-0.60) between $\log(F_{ROH>1.5})$ and the proportion of individuals who justify an honour killing against women and men, respectively. However, the association with justification of honour killings against men seems to be principally driven by two outliers – Pashtun and Nuristani respondents. As one would expect, societies that practice cousin marriage tend to have higher and more variable values of $F_{ROH>1.5}$ than amongst those that do not practice cousin marriage. Overall,

the average ethnicity $F_{ROH>1.5}$ ranges from 0.63% amongst Egyptians to 6.75% amongst Balochi in our sample. For context, an increase of 6.25% in F_{ROH} is equivalent to the difference between the offspring of first cousins and those of unrelated parents (Clark et al. 2019).



killing against either a man or a woman.

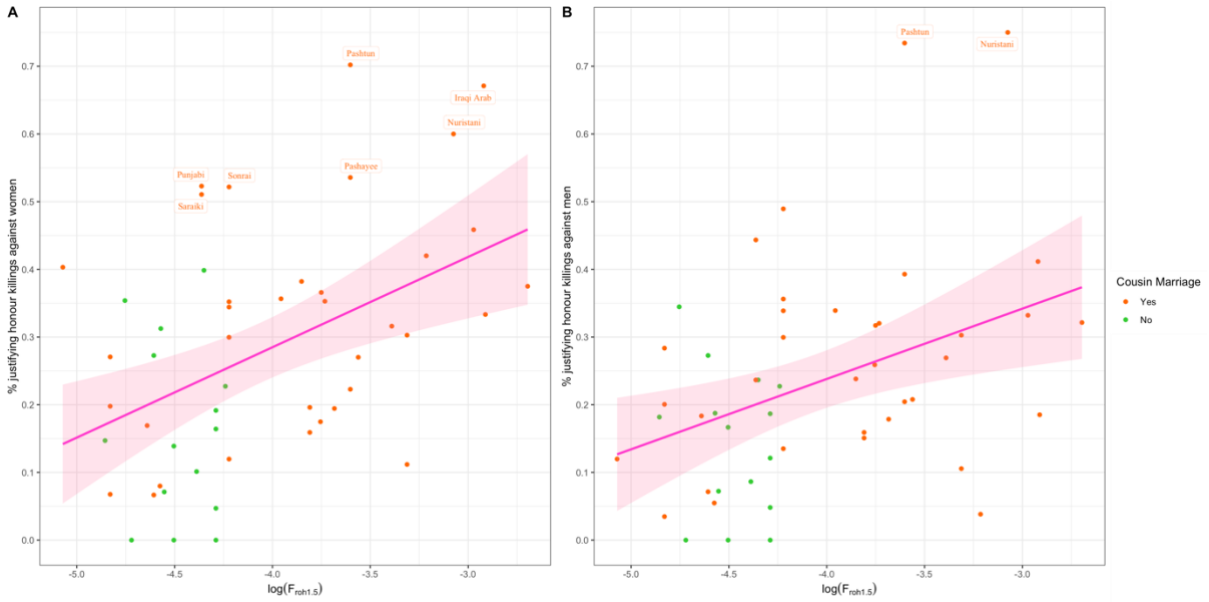


Figure 5-2: Correlation plots between the log average $F_{ROH>1.5}$ and the percentage of individuals who justify honour killings against A) women and B) men, coloured by whether the society is reported to practice cousin marriage. The shaded area presents 95% CI of linear regression.

First, I address the association between $F_{ROH<1.5}$ and honour killings against women (Table 1A). Multi-level logistic regressions controlling for the sex, education, age, religiosity, urban/rural living of the respondent, and clustered at the ethnicity level, estimate that a 1% increase in $F_{ROH>1.5}$ is associated with a 28% increase in the likelihood of justifying an honour killing against a woman, significant at the 5% level (Table 1A, model 2). An association between two traits across cultures can be due to shared cultural ancestry (Mace and Pagel, 1994) so we also control for this using random effects for language family. This reduces the magnitude of the association, although it remains large and significant at the 5% level (OR: 1.20, 95% CI 1.01-1.41) (Table 1A, model 3). Including whether an ethnic group practices cousin marriage is strongly associated with the justification of honour killings (OR 1.80, 95% CI 1.01-3.20) although the odds ratio for $F_{ROH>1.5}$ remains large and positive (Table 1A, model 4). Since $F_{ROH>1.5}$ captures variation in the degree to which a group has practiced consanguineous marriage, this indicates that there is still value in knowing this variation after knowing whether cousin marriage is normative. In other words, not only does the presence of cousin marriage matter, but so too does the frequency at which it occurs. Including both cousin marriage and language family leads to the loss of statistical significance although this is expected given that language family is likely to be highly associated with whether a society practices cousin marriage, which in turn is predictive of higher $F_{ROH>1.5}$.

Table 1B presents the results for the association between $F_{ROH<1.5}$ and honour killings against men using the full sample. The odds ratios are considerably smaller than those for honour killings against women and lose significance on addition of a random effect for language family (Table 1B, model 3). Furthermore, removal of Nuristani and Pashtun respondents, which could be driving the positive association between $F_{ROH<1.5}$ and justification of honour killings against men (see Figure 5-2) reduces the size of the association and causes the loss of significance across all values of F_{ROH} (Appendix B,

Table B10). The same is not true of justification of honour killings against women, which remain significant and large when introducing a random effect for language family and removing Pashtun and Nuristani respondents (Appendix B, Table B6).

Table 5-1 Odds ratios (OR) and 95% confidence intervals (CI) of multi-level logistic regression of average ethnicity-level $F_{ROH>1.5}$ on the likelihood of justifying an honour killing against a woman (Table 1A) or a man (Table 1B). All models include a random intercept for ethnicity. Language family is introduced as an additional random effect. Individual level controls include sex, age group, education, urban/rural living, and religiosity. Education data is missing for Moroccans, so Moroccan Arabs and Rifians are lost from the model when education is added as a control. ****** p<0.001 ** p<0.01 * p<0.05 • p<0.1***

TABLE 1A: HONOUR KILLINGS AGAINST WOMEN					
	Model 1 OR (CI)	**Model 2** OR (CI)	**Model 3** OR (CI)	**Model 4** OR (CI)	**Model 5** OR (CI)
$F_{ROH>1.5}$	1.33*** (1.12-1.58)	1.27** (1.08-1.49)	1.20* (1.01-1.41)	1.19* (1.00-1.41)	1.16 • (0.98-1.37)
Cousin Marriage (ref: none)				1.82* (1.01-3.25)	1.56 (0.84-2.90)
GDP		Yes	Yes	Yes	Yes
Individual Level Controls		Yes	Yes	Yes	Yes
Random Effect for Language Family			Yes		Yes
Observations	29068	27182	27182	27182	27182
Ethnic groups	52	50	50	50	50

TABLE 1B: HONOUR KILLINGS AGAINST MEN					
	Model 1 OR (CI)	**Model 2** OR (CI)	**Model 3** OR (CI)	**Model 4** OR (CI)	**Model 5** OR (CI)
$F_{ROH>1.5}$	1.23* (1.03-1.47)	1.17• (0.98-1.39)	1.16 (0.97-1.38)	1.12 (0.93-1.34)	1.11 (0.93-1.34)
Cousin Marriage (ref: none)				1.48 (0.79-2.78)	1.45 (0.76-2.76)
GDP		Yes	Yes	Yes	Yes
Individual Level Controls		Yes	Yes	Yes	Yes
Random Effect for Language Family			Yes		Yes
Observations	29142	27261	27261	27261	27261
Ethnic groups	52	50	50	50	50

Interestingly the associations hold for honour killings against women at all levels of F_{ROH} ranging from a minimum length of 0.5Mb to 10Mb and get stronger with increasing length. An increase of 1% in $F_{ROH>10}$ is associated with a 26% increase in the likelihood of justifying an honour killing against a woman controlling for GDP, all individual level controls, and language family (Appendix B Table B3). This indicates three things. Firstly, that it is recent parental relatedness, and not other population dynamics that can produce ROH such as population bottlenecks, that are driving the associations. Secondly, that more extreme consanguinity is more highly associated with honour-based violence. Thirdly, that more recent consanguinity has a greater effect on the association than more distant consanguineous events. This third point is noteworthy given that the behavioural outcome is

contemporary and hence this shows that contemporary inbreeding events are more highly associated with our outcome.

Additionally, associations hold at longer lengths of ROH, albeit weakened, when I exclude Afghanistan, Iraq and Uzbekistan from the models (Appendix B Table B4 & B7). Odds ratios remain positive, although significance is lost, for honour killings against women when using only perfect genetic matches, which reduces the number of ethnicities from 50 to 27 (Appendix B Table B5). Under all model specifications the associations with justifying an honour killing against a man are weaker and sometimes non-existent compared to women (Appendix B Tables B7-B10).

Other literature in economics and psychology has used the kinship intensity index (KII) to predict outcomes on a global scale, such as psychological variation and economic development (Bahrami-Rad et al., 2022; Schulz et al., 2019). I also test whether the KII can explain any variation in honour-based violence in the sample. The KII does not associate with the likelihood of justifying an honour killing against a woman, although the odds ratio is greater than 1 the confidence interval is very wide (OR = 1.19, CI 0.73-1.94) (Table 5-2, Model 1). Furthermore, the KII does not associate with $F_{ROH>1.5}$ indicating that it is unable to pick up differences in kinship intensity within the sample (Table 5-3).

Table 5-2 Odds ratios (OR) and 95% confidence intervals (CI) from multi-level logistic regression of the Kinship intensity index (KII) on the likelihood of justifying an honour killing against a woman or a man. All models include a random intercept for ethnicity. Individual level controls include sex, age group, education, urban/rural living, and religiosity. Education data is missing for Moroccans, so Moroccan Arabs and Moroccan Berbers are lost from the model when education is added as a control. Since the cousin marriage variable from D-PLACE is used to create the KII indicator it is not included as a covariate in these models. HK = Honour Killings. *** p<0.001 ** p<0.01 * p<0.05 • p<0.1

	Model 1 OR (CI)		**Model 2** OR (CI)		**Model 3** OR (CI)	
HK against F or M	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**
KII	1.19 (0.72-1.95)	1.23 (0.75-2.02)	1.25 (0.80-1.95)	1.21 (0.76-1.93)	1.12 (0.71-1.76)	1.18 (0.74-1.89)
GDP			Yes		Yes	
Individual Level Controls			Yes		Yes	
Random Effect for Language Family					Yes	
Observations	28762	28836	26934	27015	26934	27015
Ethnicities	44		42		42	

Table 5-3 Coefficients and Standard errors (SE) from a linear regression of the Kinship intensity index (KII) on the average ethnicity level $F_{ROH>1.5}$. Model 1 contains all matched KII and ROH values whereas Model 2 compares only KII and ROH matches that were both perfectly matched to the self-reported ethnicity. In other words, Model 2 contains only ethnicities where we were able to match both a genetic group and a D-PLACE society perfectly and did not use any proxy groups. *** p<0.001 ** p<0.01 * p<0.05 • p<0.1

	(1) Coef (SE)	(2) Coef (SE)
KII	0.004 (0.003)	0.003 (0.005)
Ethnicities	43	22

Female inheritance and pastoralism interact to associate with honour-based violence.

I also test whether female inheritance and pastoralism are associated with the justification of honour-based violence in the ethnicity-level sample, using two binary variables on whether an ethnic group is recorded as having female inheritance and whether the majority of their subsistence comes from pastoralism. Neither female inheritance nor pastoralism is independently significantly associated with the likelihood of justifying violence against women or men (Table 5-4, Model 1). This is contrary to the verbal model which argued that female inheritance may be one of the drivers of cousin marriage, which in turn should drive the strength of the honour culture. It is also contrary to other empirical work that has demonstrated that there is an association between pastoralism and proxies of honour beliefs (Cao et al., 2021).

However, introducing an interaction term indicates that pastoral societies with female inheritance are associated with the likelihood of justifying violence and this is robust to introducing a random effect for language family (Table 5-4, Model 2).

Table 5-4: Odds ratios (OR) and 95% confidence intervals (CI) of multi-level logistic regressions of average ethnicity level $F_{roh>1.5}$ and whether the ethnic group practises female inheritance and pastoralism on the odds of justifying an honour killing against a woman and a man (Models 1). Model 2 includes an interaction between pastoralism and female inheritance. All models include a random effect for ethnicity. Individual level controls include sex, age group, education, urban/rural living, and religiosity. HK = honour killings. ****** p<0.001 ** p<0.01 * p<0.05 • p<0.1***

	Model 1 OR (CI)		**Model 2** OR (CI)	
HK against F or M	**Female**	**Male**	**Female**	**Male**
$F_{ROH>1.5}$	1.30** (1.06-1.58)	1.22* (1.01-1.46)	1.30* (1.03-1.64)	1.17● (0.98-1.40)
Female Inheritance	0.99 (0.58-1.68)	0.70 (0.43-1.16)	0.75 (0.11-0.96)	0.54* (0.31-0.94)
Pastoralism	0.62 (0.33-1.19)	0.65 (0.35-1.20)	0.32* (0.11-0.96)	0.42* (0.19-0.89)
Female Inheritance X Pastoralism	-	-	3.54* (1.08-11.53)	2.92● (0.93-9.23)
GDP	Yes	Yes	Yes	Yes
Individual Level Controls	Yes	Yes	Yes	Yes
Random Effect for Language Family	Yes	Yes	Yes	Yes
Observations	26744	26823	26744	26823
Ethnic groups	45	45	45	45

5.5 METHODS 2

Analysis 2: Proxy behaviours of honour cultures and self-reported levels of consanguinity

To mitigate doubts that results are due to omitted country level variables or unaccounted cultural history I show that the association between cousin marriage and honour-related behaviour also holds between regions across four countries. The following surveys were used from the demographic health surveys (The DHS Program, 2022): Jordan 2007, 2012, 2018; Egypt 2014; Pakistan 2012 and 2017; and Turkey 2013.

Respondents were asked whether they were related to their husbands by blood and if so, what was the degree of relatedness, which I used to calculate a regional level proportion of all marriages that were between first cousins. Next, I use two binary proxies of honour-related behaviours 1) whether the respondent justified domestic abuse from a husband if a wife "goes out without telling him" and 2) whether the woman is employed outside the home. These attempt to capture a typical characteristic of honour cultures: female seclusion and gender segregation. In strict honour cultures women are more likely to be expected to stay inside the home, and if they are to go outside, they should be chaperoned. A binary variable of whether a respondent justified violence was created by giving all individuals a score of 1 if they said it was justified and a score of 0 if they said no or that they didn't know. In terms of employment, individuals were given a score of 1 if they said they were employed outside the home and a score of 0 if they were not employed at all or employed inside the home. The DHS also reports a respondent's wealth, their education level, their year of birth and whether they live in an urban or rural area. Year of birth was categorised into 10-year intervals: 1957-1967, 1968-1978, 1979-1989, and 1990-2003.

Analysis

In order to analyse the association between the percentage of marriages that are between first cousins and our two honour-based proxies I fit another multi-level logistic regression model in R (R Core Team, 2021) using the R package lme4 (Bates et al., 2015). Random intercepts for region and country are modelled to account for the hierarchical structure in the data and to allow me to investigate the association of a regional-level predictor on an individual-level outcome. Two sets of models were fit depending on whether the outcome variable was the justification of violence against a woman or being employed outside the home. Individual controls include wealth, education, year of birth group, and whether they lived in an urban or rural area. Any individuals who had missing data for any of the variables used were not included in the analyses.

5.6 RESULTS 2

Higher rates of cousin marriage associates with honour-related behaviours across regions within countries

Figure 5-2 illustrates a positive and negative association between the frequency of cousin marriage and the proportion of woman justifying violence or being employed outside the home, respectively. A 1% increase in the regional proportion of marriages that are between cousins is associated with a 5% increase in the likelihood of justifying violence against a woman if she goes out without telling her husband, and a 2% decrease in the likelihood of being employed outside the home, significant at the 1% and 10% level, respectively (Table 5-5). The association between cousin marriage and the honour-based proxies is unclear for Pakistan, which may be due to the small number of administrative regions in Pakistan or an asymptotic effect due to the particularly high rates of consanguinity compared to Egypt, Jordan, and Turkey.

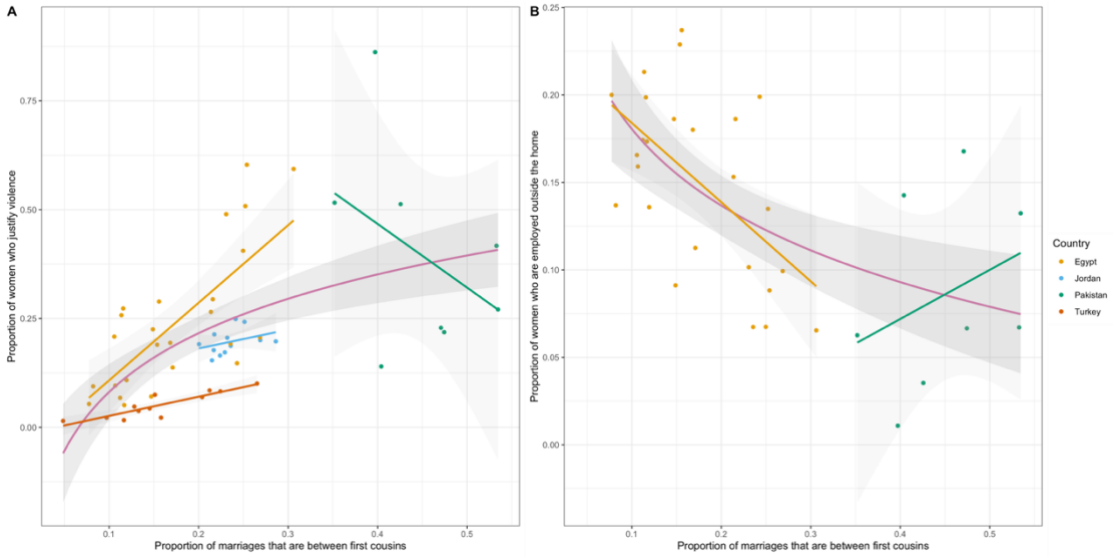


Figure 5-2 Correlation plots between the regional proportion of marriages that are between first cousins and A) the proportion of women who believe violence is justified when a wife goes out without telling her husband and B) the proportion of women employed outside the home, coloured by country. Shaded area presents 95% CI of a linear-log regression.

Table 5-5: Odds ratios (OR) and 95% confidence intervals (CI) from multi-level logistic regressions of the regional proportion of marriages that are between first cousins on the likelihood of 1) justifying violence against a woman if she goes out without telling her husband and 2) being employed outside the home. All models include random intercepts for region and country. Controls include year of birth, education, wealth, rural living. Jordan and Turkey are excluded from model 2 due to missing data for female employment. *** p<0.001 ** p<0.01 * p<0.05 • p<0.1

	Model 1 OR (CI)	**Model 2** OR (CI)
	Justification of violence	Employed outside the home
% of marriages between first cousins	1.05*** (1.03-1.08)	0.97• (0.96-0.99)
Observations	97024	49597
Regions	57	33
Countries	4	2

5.7 DISCUSSION

Here I add to the literature that kinship intensity can explain variation in cultural traits, by demonstrating a robust positive association between cousin marriage and honour-based violence across ethnic groups located primarily in the Greater Middle East. I also show that these relationships hold between regions within countries for other honour related behaviours. Finally, I provide preliminary evidence for a positive interaction between pastoralism and female inheritance in the emergence of honour cultures. Kinship intensity has previously been implicated in explaining global psychological variation (Curtin et al., 2020; Schulz et al., 2019), economic development (Bahrami-Rad et al., 2022), democracy (Schulz, 2022), and corruption (Akbari et al., 2019).

The hypothesis proposed that there is parent-offspring conflict, or conflict between the individual and the wider kin group, over cousin marriage, which fosters the emergence of an honour culture as a way of policing marriage choices among offspring. Cousin marriage is argued to benefit parents and the wider kin group through consolidating wealth and creating more highly related groups. These benefits will increase where women inherit, to avoid wealth escape that would occur with post-marital dispersal. Where groups are required to make collective decisions on issues such as warfare and migration, as was often the case across the Arabic peninsula and among pastoral groups, cousin marriage could increase alignment of aims through higher relatedness. Analogously, mathematical modelling has shown that honour is driven by the amount of aggression in the environment, and the lack of any other institution to control aggressive individuals (Nowak et al., 2016). By contrast, offspring suffer the costs associated with marrying close kin, such as genetic disorders and higher infant mortality (Bener and Mohammad, 2017).

The historical practices of female inheritance, cousin marriage, and honour-based violence have been widely documented across the Mediterranean region, including Italy, Greece, and the Middle East (Goody, 1983; Skourtanioti et al., 2023; Tillion, 1983). The Western edge of the European Mediterranean region is now characterized by lower levels of intensive kinship and honour compared to the Greater Middle East, and this divergence has been attributed to societies transitioning away

from intensive kinship, possibly because of a ban on cousin marriage imposed by the Christian Church (Goody, 1983; Schulz et al., 2019; Welzel et al., 2021). In contrast, the spread of Islam in the East brought with it the law of female inheritance, which dictated that females should inherit half the value of what their brothers inherit. This posed a problem to family held wealth. Where wealth is held in land, female inheritance threatens to reduce its value through division, as if daughters marry outside the kin group she will relocate to another village. The problem is not entirely alleviated with pastoralists either. Tillion (1983) describes a situation where on the death of a pastoralist the division of his estate between his dependents does not actually result in any visible change to the ownership of the wealth. This is because his widow and daughters, left their rightful share of goats or cows, may still be less well provided than if the animals were kept together as a family holding. In these instances, it is common that the eldest son continues to support those that have a right over the family wealth without ever actually redistributing the property, yet everyone will still know what belongs to each man and each woman.

Marrying women to their cousin, particularly to their father's brother's son (patrilateral parallel cousin), avoids these problems, as would marrying a more distant patrilineal cousin, as her inheritance remains within the patrilineal group. Islam is associated with patrilateral parallel cousin marriage, which maintains wealth within the patrilineal group (Korotayev, 2000), and cousin marriage does effectively consolidate wealth and intergenerational transfers through the patriline (Johow et al., 2019). Changes to Hindu law in 2005 that entitled women to inheritance led to an increase in cousin marriage and a decline in pre-marital sex (Bahrami-Rad, 2021). Even in societies without female inheritance, daughters may still inherit when they have no brothers, in which case she may be married to her father's brother's son, a pattern observed in ancient Greece (Goody, 1983), historical Germany (Johow et al., 2019), and contemporary Bangladesh (Shenk et al., 2016).

I also posited that this parent-offspring conflict could be sex-biased if the costs and benefits flow unevenly to one sex, such as if men can offset the cost of inbreeding depression through polygyny, if brothers gain fitness benefits from their sisters marrying relatives through marriage exchanges, and if it allows males to marry a younger women or avoid a shortage of mates, all of which have been documented (Aswad, 1971; Chagnon et al., 2017; Dalzero et al., 2023). A further possibility is that punishing or murdering women is less costly for families than punishing a man. Men are stronger and more likely to resist and the strength of a lineage depends on the number of men, where the loss of one might weaken it (Barth, 1986). The data bears out this sex bias in conflict, given that the associations were stronger for justifying honour killings against women, but weaker or non-existent when outliers were removed, for justifying honour killings against men.

It is nonetheless the case that many of the ethnicities did frequently justify honour killings against men, sometimes to a greater degree than women, such as among Nuristani respondents. Honour cultures are complex and whilst I have focused here on aspects of honour cultures related to behaviour around sex and marriage, honour codes control behaviour beyond this specific area. Codes

of honour and the principle of blood guilt determines who is responsible for avenging the death of a kinsman, which in the case of many Arabic and Islamic groups historically, was all men within five degrees of agnatic relationship (Murphy and Kasdan, 1959; Robertson Smith, 1885) or in the case of the Albanian blood feud, members of the patrilineage or more often 'those that live under the same roof' (Mustafa and Young, 2008). But honour codes also control male sexual behaviour. Amongst the Awlad-Ali, an Egyptian Bedouin group, men who pursue women do not have aql, the virtue of self-control, and they will be ridiculed and described as bita sabāya, literally meaning 'belonging to women' (Abu-Lughod, 2016). Similarly, Fulani men who fall in love too deeply are ridiculed as lacking pulaaku - the set of qualities appropriate to a Fulani, a form of honour (Riesman, 1998). The underlying sentiment is that if the marital bond becomes too strong, men will neglect their kinship bonds to the detriment of the wider group. Analogously, the rise of 'romantic' love in literary history occurs in tandem with economic development, possibly because development breaks down extended family ties and limits the ability of family to control the marriage choices of offspring (Baumard et al., 2022). Similarly, the death of the patriarch who is able to enforce marriage choices can lead to sons and grandsons reneging on their obligations to marry cousins and the ultimate dissolution of the patrilineal group, indicating that men too have conflict with their kin group (Kressel, 1986).

In contradiction to the historical account I have given of the benefits of cousin marriage, including consolidating wealth and protecting pastoral groups vulnerable to warfare, I find no evidence that female inheritance or pastoralism is associated with honour. There are several reasons why this could be the case. Firstly, the measures of female inheritance and pastoralism are crude and are unable to differentiate between societies that record norms of female inheritance but in practise disinherit women (Barth, 1986) and societies that vary in their dependence on pastoralism. Secondly, the idea that female inheritance may influence control over female sexual behaviour through honour cultures contradicts other literature and our own intuition that female inheritance should increase female independence and sexual freedom (Hartung, 1981; Holden et al., 2003). Instead, what may be relevant is the introduction of female inheritance into societies that previously were solely patrilineal, which I was unable to test with this data. What I do find is that there is a positive association with honour in societies with both female inheritance and pastoralism. Whilst I caution the reader from drawing too much significance from this result, as only 5 groups were coded as having both female inheritance and a predominantly pastoralist mode of subsistence, I offer some speculation as to the reasons for this result. Firstly, groups that are both pastoral and practise female inheritance are incredibly rare cross culturally, as evidenced by the strong link between the adoption of pastoralism and the loss of matriliny (Holden and Mace, 2003) (see section 1.2.4 for why). As such, what I may be picking up with these societies, are ones where female inheritance is being introduced to societies that previously were solely patrilineal, possibly explained by the spread of Islam and the Koranic law of female inheritance. Another possibility is that women in pastoral groups may be less likely to be disinherited than their counterparts in non-pastoral groups, due to the moveable nature of wealth, although I have described above how dividing herds can still be costly. Therefore, the combination of female

inheritance and pastoralism provides significant incentive to control the sexual behaviour of women through honour as there is greater risk of wealth division.

Whilst I have discussed benefits to the kin group of cousin marriage, the costs to the individual are less well established, apart from the costs of inbreeding depression. However, cooperation among kin is also highly correlated with conflict among kin, since those most likely to be sharing resources also have the most to fight about (Mace, 2013; Wu et al., 2013). Large lineages structured by cousin marriage are at risk of high levels of conflict. Murphy & Kasdan (1959) highlight the fission fusion dynamics common to groups structured by cousin marriage where at some point the lineage becomes too large and segments due to internal conflicts. Cousin marriage increases cooperation between agnates who can pool resources and join in conflict against other groups, since agnatic groups can easily aggregate together to form larger political entities. However, conflict does emerge between brothers who wish to divide the patrimony, and each will compete for a larger share. Similarly, women may derive benefits from marrying kin, through increased bargaining power and social status (Abu-Lughod, 2016; Aswad, 1971), but at some point, it may benefit her instead to marry exogamously, and it is in these moments that conflict arises. It is the punctuation of a highly related cooperative group with conflict that likely drives the association between cousin marriage and honour at the population level, whereas previous research at the individual level has found unclear relationships between cousin marriage and honour-based violence (Campbell and Mace, 2022).

Strengths and limitations

The use of genetic data is novel in the social sciences and its strength is demonstrated by the lack of ability of the kinship intensity index (KII) to account for differences in kinship intensity across ethnic groups that are more similar, given its lack of association with F_{ROH} in the sample. Firstly, the validity of variables drawn from the ethnographic record has been subject to critiques over data quality (Tobin, 1990), although more recent evidence suggests that the ethnographic accounts do hold contemporary validity (Bahrami-Rad et al., 2021). But even if the variables that make up the KII are reliable the KII is only relevant to studying variation across the whole range of human societies. In this case, small random variation in the sub-indicators is overweighted by the index as the societies tend to be similar across these dimensions. Furthermore, the KII weights each sub-dimension equally, in that it assumes that polygyny, cousin marriage, co-residence of extended families, descent patterns and community organisation all contribute equally to kinship intensity. This is a largely untested assumption, and I would argue that cousin marriage is likely to have a much stronger influence than unilineal descent, for example, on fostering dense kin networks. In contrast to the KII, the genetic measurements are both continuous and allow us to infer the extent of cousin marriage in the past, whereas codes drawn from ethnography are synchronic observations made at the time ethnographers investigated each society.

The limitations of this research, as with much of social science, is that the results are correlational, although I attempt to make the results more robust by showing that the results hold between regions

within countries, using country fixed effects. There are also limitations to using multiple datasets and relying on survey data, in that the data are collected at different times by different researchers and survey participants may conceal true beliefs. However, given the sensitivity of the topic there are severe limitations on what sorts of data collection are possible. Direct questioning is next to impossible given the severity of an honour killing, resulting in attitudinal questions being the most appropriate. Secondly, concealment of true beliefs around honour-based violence is likely to make the results more conservative, rather than inflating them. Lastly, empirical tests of the hypothesis are novel in the honour literature, despite having been hypothesised decades ago (Tillion, 1983). I therefore rely mostly on verbal models and theory when evidencing why I might expect to see an association between cousin marriage and honour and what might drive conflict. Future research will engage specifically in modelling the costs and benefits to different individuals and groups of individuals.

CHAPTER 6: SKEWED SEX RATIOS ASSOCIATE WITH REPORTS OF HONOUR KILLINGS BUT NOT SEXUAL VIOLENCE. A CASE-CONTROL STUDY USING NEWSPAPER REPORTS FROM PAKISTAN.

6.1 ABSTRACT

Concerns have been raised that an excess of men leads to higher levels of societal violence, including violence against women, although more recent evidence has challenged this view. One area of violence against women that remains untested is honour killings, a type of femicide that is conventionally perpetrated by kin, and which may also be sensitive to variations in the sex ratio. Honour killings remain an understudied area of violence against women largely because of a lack of good-quality data. Governments and police do not collect comprehensive data on the topic and the severity of the violence has meant that interview or panel data on the subject is unable to be gathered. Best estimates tend to use media reports to estimate the numbers of honour killings, but these are subject to high levels of bias in reporting. I use a novel dataset of media reports of honour killings and cases of sexual violence from Pakistan for the years 2015-2022 to test whether the district sex ratio is associated with these two types of violence against women. To address the bias in media reporting I implement a simple case-control study using an identically collected dataset of media reports of suicides to act as the control group. I find that, in line with mating market predictions, reports of honour killings are lower in areas where the sex ratio is male-biased. By contrast, I find no clear relationship between the sex ratio and cases of sexual violence.

6.2 INTRODUCTION

In recent years, there has been considerable attention in popular media and academic discourse regarding the potential societal consequences of imbalanced sex ratios, particularly when an excess of men is observed. Historical concerns have revolved around the idea that such sex imbalances, particularly pronounced in some South Asian countries, could contribute to a range of negative social outcomes, including heightened levels of violence. A specific focus has been on the implications of son preference in these regions, with alarmist speculations suggesting links between skewed sex ratios and increased instances of sexual and domestic violence against women (Hudson and den Boer, 2004). However, more recent contributions from sexual selection theory have challenged these dire predictions. Instead, in situations of male-biased sex ratios, males may adapt their behaviour in response to the elevated bargaining power of females, ultimately leading to a decrease in violence. This shift is thought to occur since males seek to avoid the costs associated with heightened competition when females are in short supply (Kokko and Jennions, 2008). While previous research

has explored associations between the adult sex ratio and sexual and intimate-partner violence (HBV), no study has looked at the potential impact on honour-based violence.

HBV encompasses a wide spectrum of violence, broadly construed, perpetrated in the name of honour. One key characteristic of the type of honour cultures that are common to the Middle East and South Asia, including Pakistan, is the significant control parents exercise over the marriage choices and sexual behaviour of their daughters. HBV encompasses actions such as restricting female mobility, male chaperones, female claustration, physical violence, and, at its most extreme, honour killings. Honour killings, where a victim is murdered, typically follow accusations of sexual impropriety, including the rejection of arranged marriages, premarital sex, adultery, and lesser infractions such as unchaperoned outings or wearing makeup and clothes deemed immodest (Gill et al., 2014). Unlike other forms of violence against women, honour killings are distinct in that they are often perpetrated by male relatives, such as fathers, brothers, uncles, and cousins (D'Lima et al., 2020; Khan, 2006; Kressel et al., 1981; Kulczycki and Windle, 2011; Kulwicki, 2002).

The United Nations Population Fund estimates that there are 5000 honour killings occurring annually (UNFPA, 2000). Some estimates exist for specific countries. For instance, in Jordan, an estimated 15-20 honour killings occur each year (Human Rights Watch, 2017). In Afghanistan, there were 357 documented cases between 2018 and 2019 (AIHRC, 2019), while Pakistan reported an average of 578 honour killings a year between 2008 and 2014 (Aurat Foundation, 2015). Even within the United Kingdom, 8 threats to commit honour killings were reported in 2021 (Home Office, 2022). All figures likely substantially underestimate the actual occurrence of honour killings worldwide.

The theoretical foundation for predicting an association between an excess of males and increased violence is rooted in sexual selection and parental investment theory (Trivers, 1972). In humans, males are the sex with the higher potential reproductive rate and therefore compete more intensely for mates since male reproductive success tends to be more variable and increases more steeply with each additional mate, than that of females (Bateman, 1948; Janicke et al., 2016). Consequently, women become the limiting sex that men compete for. If the adult sex ratio becomes male-skewed, competition amongst males will increase further. This competition is often considered to be aggressive, showing up as increased violent crime within society. Evidence suggests that the intensity of sexual selection increases weaponry in animals (Bro-Jørgensen, 2007) and male-biased sex ratios have been found to associate with total murder rates (Drèze and Khera, 2000), female homicide (Titterington, 2006), intimate partner violence (D'Alessio and Stolzenberg, 2010) and emotions of aggression and depression (Zhou and Hesketh, 2017).

However, newer models in sexual selection theory indicate that instead, an abundance of males can lead to less competition and higher provisioning of care in males (Kokko and Jennions, 2008). In traditional parental investment theory, it is often assumed that when males face increased mating competition, they should invest in traits that increase their access to additional mates. Yet a valid counterargument is that when competition is stiff, an already partnered male should delay their return

to the mating pool and invest instead in caring behaviours. Similarly, unpartnered men should invest in qualities that make them more desirable as potential partners, such as demonstrating their caring behaviour, wealth, and status. Mating market theory produces similar predictions, viewing marriage as subject to conditions of supply and demand (Angrist, 2002). The rarer sex will have higher bargaining power and be able to make increased demands on mates who will cater to these desires to secure a partner. In the case of male-biased areas women have higher bargaining power and will make increased demands on males such as higher investment (Pedersen, 1991; Pollet and Nettle, 2008). By contrast, in female-biased areas, men can invest in mating effort and behave promiscuously, instead of providing high levels of paternal investment. Empirical evidence supports this view in animals, such as birds, and in humans, with male-biased sex ratios leading to lower rates of divorce, higher rates of paternal care, higher male contribution to household wealth, and later age at first birth (Angrist, 2002; Liker et al., 2013; Pollet and Nettle, 2008; Schacht and Borgerhoff Mulder, 2015; Schacht and Kramer, 2016; Uggla and Andersson, 2018; Uggla and Mace, 2017, 2016).

Empirically there does appear to be contradictory patterning between the sex ratio and violence against women (see Schacht et al., 2014 for a summary). Following traditional parental investment theory one might predict that under male-biased sex ratios men who are unable to find a partner attempt to 'steal' sex through rape, thus increasing their fertility through force (Shields and Shields, 1983). However, it is not the case that only unpartnered or low-status men commit rape (Lalumière et al., 2005). Research has documented mixed relationships between the sex ratio and sexual violence, with evidence for positive, negative, and u-shaped associations (Barber, 2000; Pabst et al., 2022b; Stone, 2017). Because the research tends to be cross-cultural, comparing countries or ethnic groups, it uses country-level sex-ratio data, rather than a level that more accurately represents the mating pool, although this is difficult to define. Using aggregate level sex ratio data has been criticised as trends can often be reversed at higher levels of aggregation and many associations are spurious, driven by broader regional dynamics (Pollet et al., 2017). Furthermore, rape as an evolved trait in humans is somewhat disputed with a lack of evidence that sexual violence does increase male fitness, with clearer evidence amongst animals for its adaptive benefit (Baniel et al., 2017). It is more likely that rape in humans is a facultative trait that may have payoffs when the behaviour is perceived to entail little risk for the man, such as in contexts of low community or institutional punishment (Vandermassen, 2011).

The association between sex ratios and honour killings remains entirely unexplored in existing literature, yet I anticipate that honour killings may indeed respond to sex ratios. Specifically, I predict that a male-biased sex ratio will be negatively associated with honour killings, as increased 'value' of women may dissuade family members from committing such acts, particularly when it enables them to secure advantageous marital alliances, demand reduced dowries, or command higher bride prices (Miller, 2001). Conversely, in female-biased sex ratios, where girls may be considered more "expendable," the cost of honour killings may be perceived as lower.

Given the inherent sensitivity surrounding the subject of honour killings, due to their extremeness, their illegality, their occurrence within close-knit familial circles and being occurring only in certain parts of the world, obtaining accurate estimates of their prevalence remains difficult. There is no means of collecting interview or panel data on honour killings due to the nature of the crime and the stigma attached to it. Individuals are unlikely to admit to knowing that a serious crime has occurred and there would be countless ethical constraints to conducting this research, particularly around disclosing information to police if individuals admit to honour killings. Furthermore, police and government data on honour killings is often not routinely collected. One means by which estimates of honour killings can be calculated is via indirect methods such as media and press reports. Here I test whether the sex ratio is associated with sexual violence and honour killings using a novel dataset compiled from newspaper reports of sexual violence and honour killings from Pakistan.

Media data has been central to research on collective action and protest movements and is common in political science and economics (Earl et al., 2004). However, media data suffers from selection bias as newspapers do not report on all occurrences of an event, nor can they in the case of violence against women, as many events will go unreported. Selection is affected by the 'newsworthiness' of the event, which can be influenced by the proximity of the event to the news agency and the extremeness of the event, such as how violent it was (Johnstone et al., 1994). Additionally, in the case of honour killings and other crimes, it is affected by the routines and 'beats' of crime reporters and the extent to which the public is interested in a certain crime. Attention cycles and the political climate can strongly influence the likelihood of coverage. For example, high profile cases, such as the 2016 honour killing of Qandeel Baloch, a Pakistani social media influencer, influences public interest and the likelihood of further cases being covered. The issue of selection bias cannot be understated (see Ortiz et al., 2006 for a full discussion of the many factors that can influence selection); however, media reports are one of the only means by which to study the topic. The question then becomes: is this imperfect data, despite possibly being the best available, worthy of analysis? One option, also used to address non-response bias in survey data, is to weight the sample in a way that produces a sample that reflects the true population. This is not possible here since I do not have appropriate information about the total population of victims of violence. Another option is to control for factors associated with selection bias. Here I adopt a two-pronged approach. Firstly, I attempt to control for some factors I believe to be associated with selection, such as the development of an area. Secondly, I employ a simplistic case control study using an identically collected dataset on suicide to act as the control group. Since this dataset is subject to similar selection bias, any difference between the two datasets should be meaningful.

I make the following predictions: 1) that a male-biased sex ratio will associate negatively with reports of honour killings and 2) that it will associate positively with sexual violence. Whilst I believe that the honour killing prediction follows clearly from mating market theory the sexual violence prediction is less straightforward. For the purpose of hypothesis testing, I predict a positive association, partly because the institutional punishment for rape in Pakistan is low and popular narrative tends to argue

that there is an excess of young unmarried men that may be responsible for perceived increasing rates of rape.

6.3 METHODS

Data

Data on honour killings and sexual violence is sourced from the Human Rights Commission of Pakistan (HRCP), which systematically compiles data on human rights abuses reported in the press, including honour killings, sexual violence, and suicide. This data has been digitised since 2015 and I use data from 2015-2022. The sampling procedure is as follows. Employees of the HRCP located in 9 offices across Pakistan scan 27 newspapers each week and search for keywords relating to human rights abuses. To be recorded as an honour killing case the newspaper article must mention the concept of honour or the term karo-kari, which is commonly used as a synonym for honour killing, particularly in the province of Sindh. To be recorded as a case of sexual violence, the report must mention several keywords including rape, sexual assault, and sexual abuse. See section 3.4 for a list of the newspapers scanned, the keywords searched for, and an example case.

The quantity of newspapers covered is large, however, the choice is somewhat arbitrary but relates to the credibility of their reporting as decided by employees of the HRCP. All major English-language newspapers are covered along with a selection of Urdu and Sindhi newspapers, whereas many local newspapers are not, as they are not deemed credible (personal correspondence with the HRCP). Newspapers regularly report the occurrence of honour killings and cases of sexual violence, but reports vary in their detail. Each case is coded for key variables like location, number of victims, sex of victim, and relationship between victim and perpetrator and reports are then checked for duplication and compiled into a final dataset. Datasets contained geographic information on the city and the province. While police in Pakistan do maintain data on honour killings and sexual violence, that can be accessed on request, they do not break down this data by district.

Administratively, Pakistan is divided into 6 provinces, 160 divisions, and 577 districts. The 6 provinces include Punjab, Sindh, Khyber Pakhtunkhwa, Baluchistan, Islamabad Capital, Gilgit Baltistan, and Azad Kashmir. In order to assign each case a district, I used the tmap package in R to geocode the location using the OpenStreetMap Nominatim (Tennekes, 2018). The geocoded latitude and longitudes were then mapped to a district using shapefiles of administrative regions of Pakistan downloaded from The Humanitarian Data Exchange (data.humdata.org) and the sf package in R (Pebesma, 2018). Whilst administratively, Islamabad the capital of Pakistan is its own province, I subsume it into the division of Rawalpindi and the province of Punjab as Islamabad only has one district and therefore contains no variation in the district-level variables.

Data on district-level variables were taken from the Pakistan Census, conducted in 2017. This includes the proportion of the population living in urban areas, the total population size, the sex

difference in literacy, and the proportion of property that is owned by women. I calculate the district sex ratio of those aged 15-49. I use the age group of 15-49 as this contains those who are most likely involved in the marriage market as well as those women who are fertile. At the division level, I control for the number of police stations. All data can be found on the Pakistan Bureau of Statistics website (pbs.gov.pk). Night-time luminosity was taken from the geographic covariates available from the Demographic Health Survey for Pakistan and a district-level average was calculated by assigning the DHS clusters to districts and taking the average.

Analytic Design

The data suffers from a high degree of selection bias due to its sampling procedure based on newspaper reports. Selection bias occurs when the individuals within a dataset differ systematically from the population of interest. In this case, variation in the dataset largely represents variation in reporting a human rights abuse rather than actual variation in the rate of abuse in the population. For example, in the whole dataset of reported honour killings from 2015-2022 only 7 cases were reported in the province of Gilgit Baltistan, compared to 5131 cases reported in Punjab. This huge difference most likely reflects differences in reporting, related to Punjab being more populous, more urbanised, better connected, and better serviced by the police and media. Remote, or hard to reach areas, are more difficult to collect information from. Similarly, the rates of reporting for honour killings, sexual violence and male suicide are highly correlated, with those districts reporting high absolute numbers of one type of violence, also reporting high numbers of another (Figure 6-1). Whilst one would expect a degree of association between these types of events, some of this correlation will be driven by the same selection bias. Because of this, I cannot accurately estimate either the population distribution of types of violence against women or the association between district-level sex-ratios and the outcome of interest. I include only cases from the provinces of Punjab, Sindh, Balochistan and Khyber Pakhtunkhwa, as too few cases were reported from Gilgit Baltistan and Azad Kashmir to examine variation across their districts.

Secondly, I attempt to address selection bias by doing a case-control study where controls are chosen to be representative of the population which produced the cases. For these purposes, I use the HRCP dataset on male suicides. The screening method is identical for cases of violence against women as cases of suicide and therefore the hypothetical 'population' that produced both is the same. I assume that the bias that affects the media reporting of violence against women is largely the same as the bias that affects the media reporting of suicide, such as media presence, police presence, and general development of the area. The final dataset that is used for analysis is a combined dataset of all reports of honour killings or cases of sexual violence, which are the cases, and all cases of male suicide, which are the controls. The difference between the two should therefore represent a meaningful difference in the number of cases of violence against women in a particular district. Whilst this does not allow me to estimate the true rate of different types of violence it does allow me to say something about

whether the risk factors for the cases are different from the controls, assuming that any difference between the number of reports is representative of a real-world meaningful difference.

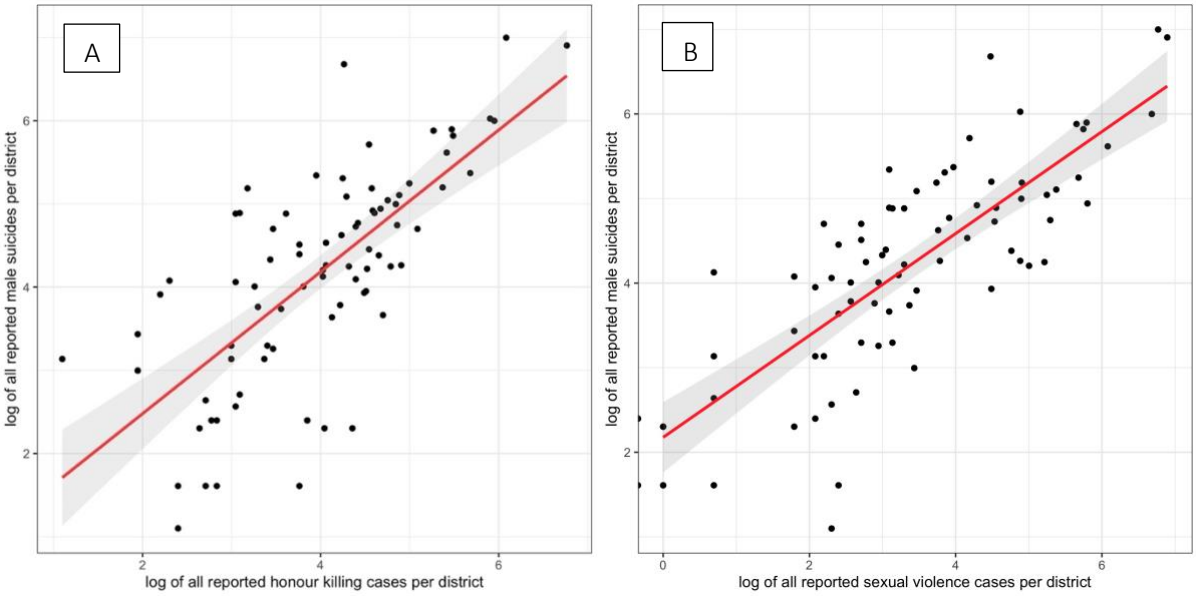


Figure 6-1 Correlations between the log of all cases of male suicide per district and the log of all reported cases of A) honour killings B) sexual violence.

Sometimes selection can introduce collider bias if both the exposure and the outcome of interest influence the likelihood of being reported in the dataset, generating a spurious association since you are forced to condition on the collider (Schuessler and Selb, 2023). Collider bias can modify an association, sometimes generating a spurious association, if the collider is conditioned on. In the case of the hypothesised effect of sex ratio on reports of honour killings, we do not believe that selection bias will also introduce collider bias. This is because while our outcome of interest may influence selection, I do not believe that our exposure will. It is possible that the outcome of interest is associated with selection given that there may be positive feedback in reporting abuses. In other words, a district that begins to report honour killings may start reporting more with time, perhaps as a consequence of a network effect. However, the exposure, sex ratio, is unlikely to be causally related to selection. Thus, I do not believe that selection will produce collider bias.

However, I acknowledge that there will still be some selection bias that differs between reporting suicide and reporting violence against women. For example, the likelihood of a case of violence against women being reported may be affected by the gender equality norms of the area, possibly with more gender equal areas being more likely to report cases due to them being more likely to prosecute and a greater number of people involved in awareness raising and activism. Similarly, this may also affect the actual baseline rate of honour killings if more gender equal areas are less likely to commit them. To control for this, I use proxy measures of gender equality including the sex difference in literacy and the proportion of property that is owned by women.

Furthermore, the group making up the controls should not include individuals with an outcome that is related to the exposure being studied, in this case sex ratio. There is some evidence that sex ratio is associated with the male suicide rate, and that this is mediated by the marriage market, with an overabundance of men resulting in an inability to achieve the social goal of marriage leading to depression and possible suicide (Kuroki, 2014; Snopkowski and Turner, 2023). One alternative could be to use only cases of female suicide, but this is problematic for another reason. In Pakistan female suicides can be related to domestic violence and are also used as coverups for an honour killing, whereby a murder is instead reported as a suicide or made to look like a suicide. I argue that while suicide rate may be responsive to sex ratio, that this effect is likely to be marginal compared to the proposed effect of sex ratio on honour killings, which are often directly related to behaviour around sex and marriage.

What causes the sex ratio imbalance may also confound any association I find if it also causally related to violence. Three major factors alter the sex ratio 1) son preference and sex selective abortion, whereby the sex ratio is altered at birth or shortly after, 2) differential mortality rates, with females tending to have lower morbidity, 3) sex specific migration, often work-related. One possible confounding path is through gender equality norms which can confound a relationship between a sex ratio driven by son preference and violence against women, since females are more likely to both be aborted and receive violence in areas with high levels of gender inequality. Similarly, the economic development of an area may affect the rate of sex specific migration and violence against women, since women may be at higher or lower risk of certain types of violence in more developed areas or in areas with higher migration. For example, there is some evidence that migration is a risk factor for intimate partner violence (Terrazas and Blitchtein, 2022). I attempt to control for some of these confounding issues through the proxy measures of gender equality and through the night-time luminosity and urbanisation of an area as ancestral causes of migration.

I also follow the work of Cinelli, Forney and Pearl in deciding whether or not to include a covariate as a means to improve the precision of the models which may remove further bias in media reporting (Cinelli et al., 2022). Broadly speaking, controlling for an ancestor of the outcome, if they do not open any confounding paths, can help to reduce variation in the outcome variable thus improving the precision of estimates. Because I believe that a large part of the selection bias is being driven by how well developed an area is and therefore how well serviced it is by police and newspapers, I include the following controls in addition to night-time luminosity and urbanisation: the population size of the district and the number of police stations at the division level.

The final analysis includes two multi-level logistic regression models clustered at the district, division, and province level. These models were performed in R (R Core Team, 2021) using the lme4 package (Bates et al., 2015). The outcome of the first analysis is whether an honour killing was reported, as opposed to a case of male suicide. The outcome of the second analysis is whether a case of sexual violence was reported, as opposed to a case of male suicide. Both models contain the same set of

controls. District-level controls include the proportion of the population that is living in an urban area, the population size, the night-time luminosity, the sex difference in literacy (calculated as the proportion of literate males over the age of 10 minus the proportion of literate females over the age of 10), and the proportion of property that is owned by women. Division level controls include the number of police stations in the division. A directed acyclic graph (DAG) presenting the hypothesised causal pathways that have been outlined in the preceding paragraphs is available in the Appendix (Appendix C Figure C1). Controlling for all covariates is a viable adjustment set to estimate the direct effect of sex ratio on reports of honour killings and sexual violence.

6.4 RESULTS

The sample consists of 105 districts that reported any honour killings, sexual violence or male suicides, from the 4 provinces described above. These districts exhibit an extremely wide range of adult sex ratios aged 15-49 from 0.80 to 1.22 (the number of men per women) with a mean of 1.02 and a standard deviation of 0.06. At the division level the sex ratios range from 0.88 to 1.12 (Figure 6-2). Higher sex ratios indicate an excess of men whereas lower sex ratios indicate an excess of women. This range allows me to examine the association of sex ratio across districts where men are in the majority to districts where women are in the majority. The overall population size across the districts for adults aged 15-49 ranges from 44,191 to 8,614,237.

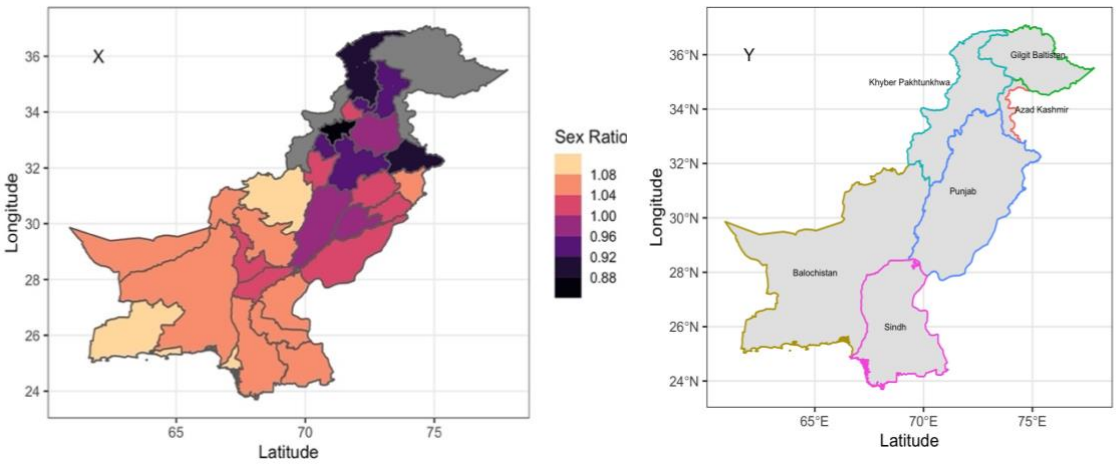


Figure 6-2 Map X presents the division level sex ratio of individuals aged 15-49. Map Y presents the provinces of Pakistan. FATA is subsumed into the province of Khyber Pakhtunkhwa.

Between 2015-2022 a total of 7731 cases of honour killings where at least one woman was killed were reported across Sindh, Punjab, Balochistan, and Khyber Pakhtunkhwa (Table 6-1). Of these, the majority perpetrator was a husband/ex, responsible for 31% of honour killings. Relatives were responsible for 30% of the cases, of which siblings were the most common perpetrators. Between 2015-2022 a total of 7825 cases of sexual violence were reported across the same 4 provinces, where

at least one woman was the victim. Of these, the majority perpetrator was by far an acquaintance/neighbour/employer, who were responsible for 83% of the cases. Many cases do not report information on the relationship between the perpetrator and the victim (27% and 10% of all cases for honour killings and sexual violence, respectively). This could be due to this information being unknown to the reporter or deemed unnecessary to report. These cases may well still have been perpetrated by husbands, relatives, or any of the other categories of perpetrator.

Table 6-1 Number of cases of honour killings and sexual violence by perpetrator. *includes step-parents.

	Perpetrator								
	Husband/ Ex	In-Laws	Parents	Siblings	Son/ Daughter	Other Relative	Acquaintance/ neighbour/ employer	No info	**Total**
Honour Killings	2373 (31%)	538 (7%)	572 (7%)	1000 (13%)	232 (3%)	533 (7%)	429 (5%)	2054 (27%)	7731 (100%)
Sexual Violence	NA	125 (2%)	140* (2%)	15 (<1%)	NA	222 (3%)	6540 (83%)	783 (10%)	7825 (100%)
Total	2373	663	712	1015	232	755	6969	2837	15556

Figure 6-3 presents division-level heatmaps of cases of honour killings, sexual violence, and male suicides for 29 divisions of Pakistan. Row A, B and C show the total number of reported cases, the number of cases per 10,000 people and the ratio of cases of violence against women to cases of male suicide, respectively. Row A demonstrates that in terms of raw data, the majority of reporting is coming from Lahore in Sindh. Calculating the reports per 10,000 introduces some more regional variation. Lastly, calculating the ratio of cases of violence against women to cases of suicide produces further differences between the two types of violence against women, with the southwest of Pakistan emerging as an area with high relative rates of honour killings compared to it being low for relative reports of sexual violence.

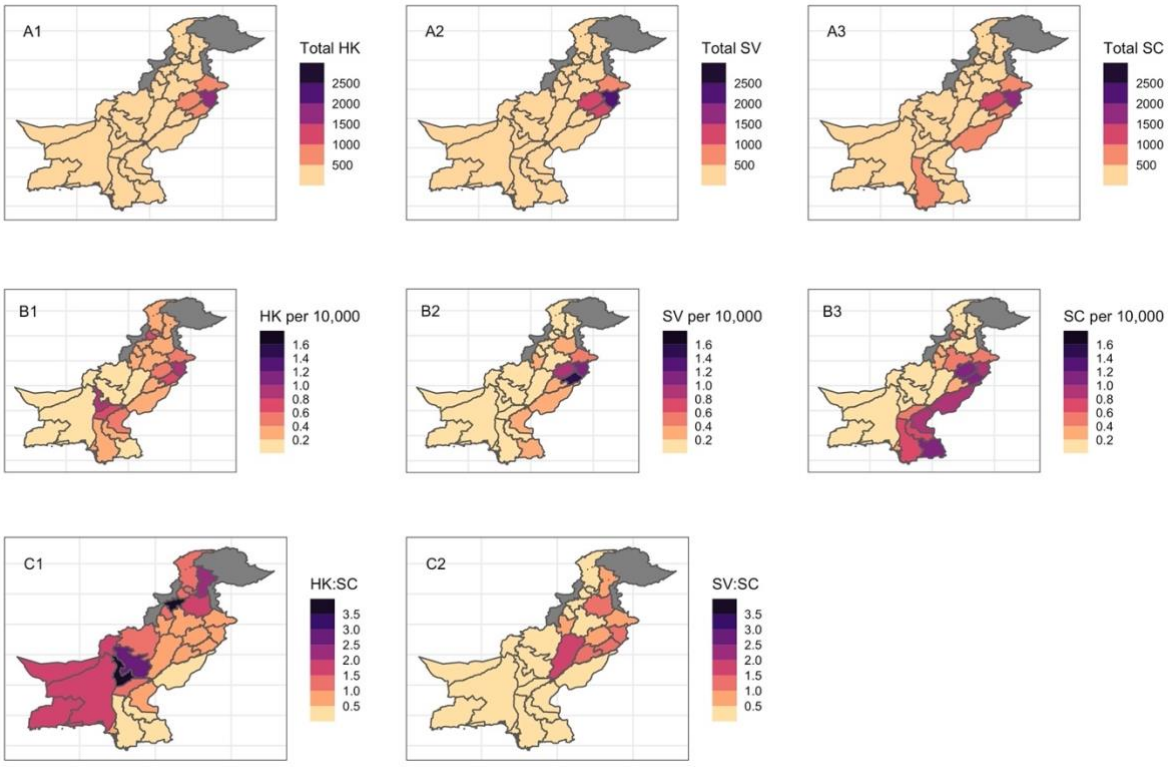


Figure 6-3 Heat maps of honour killings, sexual violence, and suicide across 28 divisions of Pakistan excluding the provinces of FATA, Azad and Kashmir, and Gilgit Baltistan which are shown in grey. Columns 1, 2, and 3, refer to honour killings, sexual violence and male suicide respectively. Row A is the total raw number of reported cases, row B is the number of cases per 10,000 and row C is the ratio of violence against women to male suicide.

Our statistical model includes a fixed effect for sex ratio and random effects for district, division, and province, which allows for heterogeneity in rates of reporting, as dictated by the multi-level structure of the data. I also control for the night-time luminosity of an area, the total population, the number of police stations at the division level, the proportion of the population that lives in urban areas, the proportion of property that is owned by women, and the sex difference in literacy rate. Model 1 includes a binary outcome of either an honour killing or a male suicide (Table 6-2). Analysis of the model finds that fewer honour killings are reported where the sex ratio becomes male-biased. An honour killing is 1.28 times less likely to be reported when the sex ratio increases by one standard deviation (OR = 0.78, CI: 063-0.98, $p<0.05$, Model 1 Table 6-2). This indicates that honour killings are responsive to the adult sex ratio when compared to a baseline rate of reporting. By contrast, a case of sexual violence is 1.22 times more likely to be reported when the sex ratio increases by one standard deviation, although this is not significant and the confidence interval is very wide (OR = 1.22, CI = 0.92-1.61, $p>0.1$, Model 2 Table 6-2). Figure 6-4 plots the predicted probabilities from the full model that an honour killing, or case of sexual violence is reported across a range of adult sex ratios for each region. The other covariates are set to their means across the whole dataset.

Several of the 105 districts reported fewer than 20 total cases of violence (summing honour killings, sexual violence, and suicide). These districts tended to exhibit more extreme ratios of violence against women to suicide, potentially biasing results. Additionally, I combine data from all years (2015-2022) and examine the association between reports and sex ratio data from the year 2017, when the census

was conducted, thus implicitly assuming the sex ratio did not vary considerably between these years. To address this, I conduct two additional analyses, one of which removes 23 districts that reported fewer than 20 cases and another that restricts the analyses to only cases reported in 2017. In both cases, the results hold for honour killings and the association becomes stronger.

Table 6-2: Odds ratios and confidence intervals for multi-level logistic regressions presenting the odds of reporting an honour killing (Model 1) or a case of sexual violence (Model 2) compared to the odds of reporting a male suicide. Models are controlled for the district-level population, night-time luminosity, the proportion of the population that is living in urban areas, the proportion of property that is owned by women, and the sex difference in literacy. Models also control for the number of police stations at the division level.

	Model 1: Honour Killings			**Model 2: Sexual Violence**		
	Whole dataset	Districts >20 cases	2017 only	Whole dataset	Districts >20 cases	2017 only
Sex Ratio 15-49	0.78* (0.63-0.98)	0.71* (0.53-0.96)	0.72* (0.53-0.98)	1.22 (0.92-1.61)	1.19 (0.93-1.52)	1.25 (0.84-1.86)
Observations	18429	18242	2747	18570	18499	2717
District	105	80	91	101	80	84
Division	28	25	28	28	25	28
Province	4	4	4	4	4	4

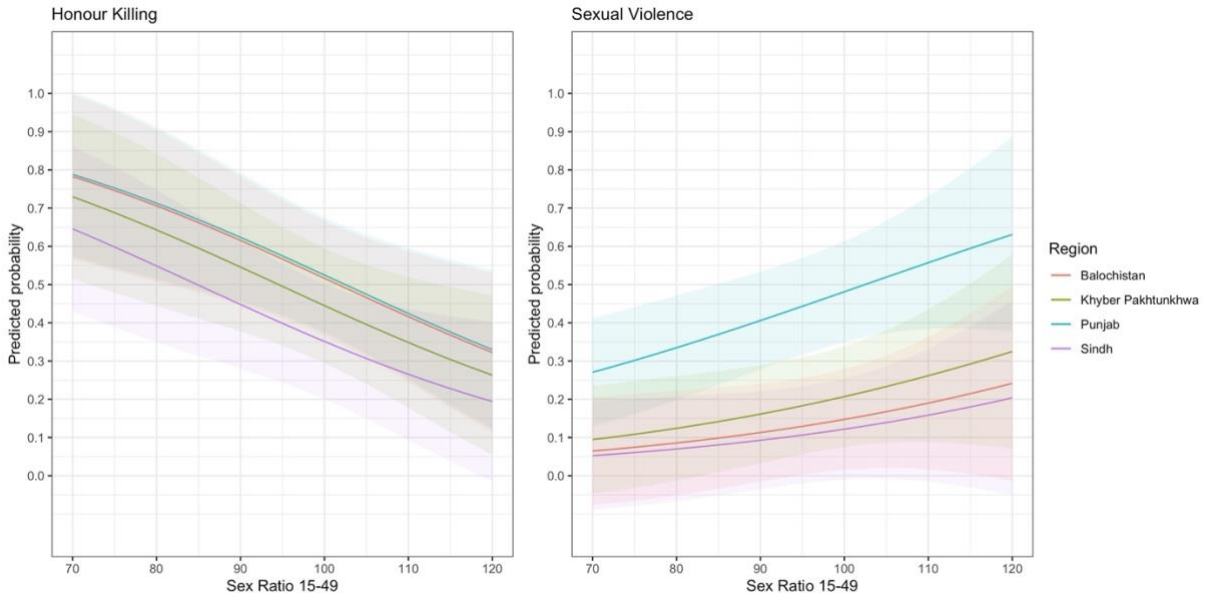


Figure 6-4: Predicted probabilities and 95% confidence intervals of reporting an honour killings or case of sexual violence for each region across a range of sex ratios. The random effects are set to the capital for each region and all controls are set to their averages across the whole dataset. Night time luminosity = 1.88 (unit = composite cloud free radiance values), the proportion of people living in urban areas = 25.1, the sex difference in literacy = 22.5, the proportion of property owned by women = 5.98, population = 1884976, and the number of police stations = 69. The sex ratio is the number of men per 100 women and runs from an excess of women to an excess of men.

6.5 DISCUSSION

In line with predictions stemming from mating market theory, this study lends support to the notion that the scarcity of women within a given population is associated with an increase in their perceived value and bargaining power. This, in turn, appears to lead to a reduction in reported cases of honour killings. Conversely, when examining the relationship between sex ratio and sexual violence, I observed positive odds ratios; however, the wide confidence intervals associated with these estimates cast uncertainty on the hypothesis that areas with an overabundance of men inevitably experience heightened levels of violence against women.

This research is the first to show that honour killings may be responsive to the sex ratio, reducing in line with the increasing value of women in male-biased areas. Traditionally, honour killings have been attributed to male kin, including fathers, brothers, uncles, and cousins, although previous research and our own data revealed a growing number of cases perpetrated by husbands (Nasrullah et al., 2009). Honour killings may decline in male-biased areas for two primary reasons. Firstly, a higher status and bargaining power for women may lead to a raised threshold for triggering an honour killing, as proscriptions around female behaviour become more relaxed. These proscriptions often involve actions such as rejecting arranged marriages, accusations of sexual impropriety, or minor transgressions like unchaperoned outings or excessive makeup use. In regions where women are scarce, they may exert greater influence in choosing their partners and enjoying increased freedom of movement without fear of repercussions. Similarly, the more men there are, the more they may be inclined to accept a 'lower value' bride, such as a woman who is considered more unchaste, since men have less choice. Therefore, the reputational pressure for families of girls to strongly signal their daughter's chastity also decreases. This line of reasoning assumes that female scarcity ultimately benefits the status of women, resulting in reduced rates of honour killings.

Secondly, honour killings may decrease in male-biased areas due to the heightened value that daughters hold for parents and extended kin networks, without necessitating a significant change in the overall status of women. In contexts like Pakistan, where parental arranged marriages are prevalent, increased bargaining power may be redirected towards parents, enabling them to arrange unions with higher-status or wealthier suitors. While such marriages benefit daughters, parents, and the broader kin group, they may not necessarily elevate the bargaining power and status of women within the marriage, particularly when marriage is perceived as a transfer of property and where divorce is societally shunned.

Moreover, the financial dynamics related to marriage transactions may contribute to the phenomenon. In many cultures, marriage involves wealth transfers, either in the form of bride prices or dowries, with the former involving a wealth transfer from the groom's family to the bride's and the latter from the bride's family to the groom's. In Pakistan, dowry is the main transfer at marriage and can account for considerable expense in both urban and rural areas (Makino, 2019). Dowry is

also a means by which families compete for eligible husbands for their daughters, with brides of higher-earning husbands receiving larger dowries (Anderson, 2000; Makino, 2019). While empirical research examining the impact of male-biased sex ratios on the financial burden of dowries in Pakistan is lacking, evidence from Taiwan and China suggests that parents receive higher bride prices for daughters in regions with skewed sex ratios (Francis, 2011; Miller, 2001), and in India, marriage squeezes that involved an excess of marriageable women led to increased dowries (Rao, 1993). A similar pattern is the strong cross-cultural association we see between polygyny, which produces male-biased operational sex ratios due to some men being unable to marry, and the practice of bride price, where men compete for limited wives (Hartung, 1982).

Not just parents, but brothers too will have a vested interest in the marriage of their sisters, particularly in contexts where exchange marriage is practised, such as Pakistan's watta satta practise, where sets of brothers exchange sisters as wives (Jacoby and Mansuri, 2010). In areas of female scarcity, there may be competition among brothers for watta satta marriages, as has been documented in other forms of exchange marriage (Chagnon et al., 2017), and a strong incentive to ensure the well-being and survival of their sisters. Indeed, in some parts of Pakistan, particularly rural Sindh, the majority of all marriages are watta satta marriages (Rehan and Qayyum, 2017)

Many of the honour killing cases in this dataset, and in previous research on honour killings in Pakistan (Nasrullah et al., 2009) were perpetrated by husbands, not kin. Nevertheless, husbands too, should exhibit responsiveness to the local sex ratio when considering the perpetration of honour killings, as the cost of femicide will rise in areas where females are in short supply. In regions with male-biased sex ratios, married men should be incentivised to maintain their existing relationships rather than re-entering the competitive mating market. Regrettably, the study faced limitations in distinguishing between honour killings carried out by husbands and those by former partners, rendering it challenging to ascertain the respective contributions of these two perpetrator groups. It is arguable that honour killings executed by former partners may not align with the same predictions in response to sex ratio dynamics, as the partnership has already been severed.

Our analysis did not discern a clear relationship between the adult sex ratio and sexual violence within the sample, suggesting that male violence does not exhibit an escalation in areas of male excess. Several factors may account for this absence of a clear association, including high costs and limited benefits associated with perpetrating sexual assault. Historically, sexual violence has not had high institutional punishment, with very few rape cases in Pakistan being prosecuted and many being settled out of court with perpetrators avoiding significant punishment (Zaman and Zia, 2013). However, in 2021 Pakistan passed the Anti-Rape Act to expedite sexual assault cases and implement harsher punishment which may have increased the risks of engaging in sexually violent behaviour. In terms of reproductive fitness, the benefits of sexual violence may not be substantial, particularly when considering the relatively low probability of pregnancy, since a man has no way of knowing whether a woman is fertile. Sexual violence as an evolved trait may be more common in species where

ovulation is advertised, such as in Chacma baboons, where males increase their aggression towards females when they are fertile, increasing their sexual access to said female (Baniel et al., 2017). In the case of humans, it is conceivable that sexual violence may yield greater fitness benefits within partnerships, where it could serve to increase sexual access to a long-term partner, for which there is some evidence (Stieglitz et al., 2018), whereas this dataset contains assaults only between unpartnered individuals. However, it is unclear why sexual violence within a partnership should vary with the sex ratio. These considerations suggest that the occurrence and motivations behind sexual violence in humans may be more complex and context-dependent than previously thought.

Furthermore, the extreme nature of the cases of sexual violence represented in this data may obscure any relationship between sex ratio and sexual violence. Media coverage and public interest in sexual violence often centre around cases characterised by their exceptional brutality. Many of the incidents in this dataset involved gang rapes and victims that were minors. These instances raise the possibility that the sexual violence observed may be driven by individuals with deviant tendencies, such as paedophilic or psychopathic inclinations, rather than representing a facultative behaviour serving any kind of reproductive purpose. By contrast, all honour killings are 'extreme' in the sense that an individual is murdered. Therefore, I argue that the dataset on honour killings is more representative of the actual occurrence of honour killings whereas the dataset on sexual violence is not, since many less violent cases are likely to go unreported.

The study was unable to differentiate between specific demographic characteristics of individual perpetrators and victims. This has implications for the predictions given that I would expect associations between the sex ratio and violence to differ depending on characteristics such as wealth and status. Mating market theory predicts that where there is an excess of men, men will invest their efforts into attracting and maintaining a single partner through increasing their desirability, evidenced by research showing that long-term relationships are more common in male-biased populations (Angrist, 2002; Grosjean and Khattar, 2019). However, lower-status men may still be predicted to engage in risky violent behaviour, if they are unable to increase their desirability through wealth-related means, as has been documented in Swedish samples (Filser et al., 2021). By contrast, research in China indicates that male-biased sex ratios have detrimental effects on male psychological health and well-being but that this does not necessarily translate into increased aggression, with men instead falling into a state of malaise (Zhou and Hesketh, 2017). Similarly, in female-biased areas, it may be poorer women who suffer the negative consequences of reduced bargaining power (Uggla and Mace, 2017).

This study examines associations between aggregate level sex ratio at the district level and individual level outcomes. Aggregate level sex ratio data has been criticised due to theoretical issues with the appropriateness of the level of aggregation, most notably whether it constitutes a meaningful measure of an individual's local marriage market. Additionally, associations found at the aggregate level can often be reversed to those found at the lower level. Here I use the lowest level of aggregation possible

given that I cannot match the newspaper reports to a smaller unit than the district. Whether the district represents a meaningful measure of the 'local' mating market is debatable. The district population size of all adults aged 15-49 ranged from 44,207 to over 8.5 million with a mean of 876,458. Whilst 8.5 million is arguably too large a population to constitute a meaningful local marriage market, 44,000 is more reasonable. On the other hand, the geographic area over which the population is spread will have a strong effect on what constitutes a local mating market, with smaller areas allowing greater interaction of people. Those areas with much higher population sizes tended to be cities and other densely populated districts which might contradict the claim that larger population sizes are indicative of aggregated units that are too large to be considered a local mating market. Since the rise of the internet and increased rates of migration, small marriage market boundaries may have broken down in favour of larger ones, although where marriages are arranged by parents, such as in Pakistan, this may not be the case. However, many arranged marriages often extend over large distances, including transnational distances (Palriwala and Uberoi, 2005). But, by and large, most marriages in Pakistan occur within the extended family, such as between cousins (see Chapter 7 for particularly high rates documented in Pakistan), or within the community (Jacoby and Mansuri, 2010). Additionally, the mechanism via which the sex ratio is supposed to affect behaviour will itself be affected by how people perceive the sex ratio. Indeed, perception of the sex ratio can bear little relation to the actual sex ratio (Filser and Preetz, 2021; Gilbert et al., 2016).

The second issue with aggregation is spatial clustering between aggregated units that can lead to spurious associations driven by broader regional dynamics (Pollet et al., 2017). This is important for both cross-cultural and cross-national comparisons, where the social environment varies considerably between units, but also spatial effects within countries. In the case of this data, there are likely regional dynamics in the rate of reporting cases. I address this issue by performing multi-level models, and clustering the data at the district, division, and region level to address that statistical relationships could be driven by non-independence of data points.

The fundamental limitation of this research is that the dataset relies on newspaper reports of violence and suffers from a high degree of selection bias as evidenced by the extremely large variation across provinces in reporting and the strong correlation between types of violence and male suicide across districts. However, no other dataset of honour-based violence exists due to the sensitivity of the topic and newspaper reports are currently the only means by which any kind of reliable estimate of honour-based violence is generated. Other options include using natal family violence as a proxy (Campbell and Mace, 2022) or agreement with normative statements that justify the use of honour-based violence (see Chapter 5). Our job as researchers is to operate within the confines of what data is available to us and to be completely transparent with what conclusions can be drawn. Ultimately, the inherent bias of data drawn from media reports prevents us from conducting social science analysis that would allow us to infer some level of causality. I attempted to control for some sources of selection bias by controlling for measures of an area's connectivity and development, as this will affect how well-serviced the area is by crime journalists and the media. Secondly, I adopted a case-control

method using a dataset that should suffer from the same selection bias as the outcome of interest. However, there may well be selection that differs between reports of violence against women and male suicide. Media reports of violence against women may be more susceptible to bias driven by current political context, media attention cycles, and intensity of the event, than male suicide. Therefore, any difference between the two datasets may simply be a difference in selection and not representative of meaningful differences in actual rates. However, if the association between sex ratio and honour killings compared to suicide was being spuriously driven by differences in selection, one would also expect to see a spurious association between sex ratio and sexual violence, assuming that selection between the two forms of violence against women *should* be similar, given that the nature of the crimes is more similar.

Conclusion

In sum, I use a novel dataset of newspaper reports of violence against women to show some of the first evidence that male-biased sex ratios may be associated with reduced numbers of honour killings in line with the increasing value of women. I caveat this by explaining why this may not necessarily mean that female status increases if the increase in female bargaining power is mostly gained by the wider family. I find no clear relationship between sex ratio and sexual violence casting further doubt on hypotheses that predict a simple relationship of more men means more violence.

CHAPTER 7: CONSANGUINITY IS NOT ASSOCIATED WITH NEWSPAPER REPORTS OF HONOUR KILLINGS IN PAKISTAN

This chapter uses the same dataset from the HRCP used in Chapter 6 but tests instead whether I find an association between rates of cousin marriage and newspaper reports of honour killing. Because of this the methods section is very brief and I refer readers back to sections 6.3 and 3.1.5 for a discussion of the dataset and methods. The reasoning for separating the two analyses is that the rationale for testing an association between sex ratio and violence against women is different than the rationale for an association between cousin marriage and honour killings. Here I discuss the data in the context of parent-offspring conflict. The results that I present here in Chapter 7 are null and deserve their own discussion given that they do not support the principal prediction that this thesis tests and, in some ways, contradict results in previous chapters.

7.1 ABSTRACT

Honour killings are an understudied area of violence against women, and little is known about the possible ecological risk factors, partly because of a lack of reliable data. It has been noted that honour cultures typically occur where groups have a preference towards cousin marriage and intensive kinship. Using a dataset of media reports of honour killings from Pakistan this paper tests whether districts with higher rates of consanguineous marriage report more honour killings. To address the bias in media reporting I implement a simple case-control study using an identically collected dataset of media reports of suicides to act as the control group. I do not find any evidence to suggest that there is a relationship between district-level consanguinity and media reports of honour killing. I discuss this null result in the context of a possible asymptotic relationship and whether I could be committing an ecological fallacy.

7.2 INTRODUCTION

Honour killing is a form of domestic violence that principally targets women and describes a phenomenon where a woman is murdered following an accusation of sexual impropriety. Whilst honour killings against men do occur - and there is a rich literature that focuses on the honour-based violence that occurs between men in the southern United States and the occurrence of blood feuds in countries like Albania - here I focus on female victims who are the principal victim common to South Asia and Pakistan.

Measuring extreme violent events such as honour killings is a complicated venture because researchers cannot directly collect this information, given the nature of the crime and its sensitivity. Individuals are unlikely to report that they themselves have committed, or that they know an

individual who has committed a violent and illegal event. Furthermore, governments, police and health agencies do not routinely collect data on honour killings. If they do, it is often aggregate reports that are not broken down by area or by the perpetrator. As a result, it is unknown how common honour killings are across the globe. Charities and non-governmental organisations have released rough estimates, but these are likely an understatement. For example, the United Nations Population Fund estimates that 5000 honour killings occur annually (UNFPA, 2000). Country-specific estimates from Afghanistan report 357 honour killings between 2018 and 2019 (AIHRC, 2019), and in Pakistan a total of 1957 honour-killing events occurred during four years between 2004 and 2007 (Nasrullah et al., 2009). For these more specific estimates from Afghanistan and Pakistan, charities and non-governmental organisations have turned to newspaper and media records as the most reliable source of reports on honour killings. Newspaper reports also tend to include some additional information such as the date, the location of the event, the relationship between the perpetrator and the victim, and the reason for the murder. Newspaper data is relatively easier to collect, as it does not have the many ethical constraints that collecting direct data would have, and it is often the only continuously available source of data on violent events.

Here I test whether cousin marriage is associated with reports of honour killings across districts of Pakistan. In order not to repeat ourselves in explaining the rationale behind why we might expect to see an association between cousin marriage and honour killings I refer the reader back principally to the entirety of Chapter 2 and the introduction to Chapters 4 & 5 (sections 4.2 & 5.2). However, I repeat the rationale briefly here.

On the one hand, staying with close kin increases cooperation within families due to both high relatedness (Croft et al., 2021; Hamilton, 1964c; Taylor, 1992a) and possible increased bargaining power (Chen et al., 2023). These hypotheses predict that staying with close kin should protect women from violence from family members, thus predicting a negative relationship between consanguinity and honour-based violence. On the other hand, cousin marriage might increase parent-offspring conflict over marriage choices, leading to the emergence of an honour culture, with its many proscriptions around marriage and sex, as a way of enforcing marriage choices among offspring.

The theory first put forward by Germaine Tillion in 1983 argues that cousin marriage was a means to keep wealth within the family, following the introduction of the Islamic law of female inheritance, and that this likely explains the strong association between Islam and cousin marriage (Korotayev, 2000). Other financial benefits to cousin marriage, particularly in contemporary times, include lower bride prices and dowry, and cheaper celebrations, all of which simplify marriage negotiations. Since families know each other, as they are related, expectations of the marriage are more easily able to be enforced and there is a higher degree of trust between families, as each can expect the other to continue to invest in the marriage (Bittles and Hamamy, 2010). Some have argued that consanguineous marriage is a substitute for dowry, which is another means by which one family ensures that the other invests in the marriage, with evidence from Bangladesh showing women in

consanguineous marriages are much less likely to bring a dowry at marriage (Do et al., 2013). Other benefits include consolidation of the kinship group which may accentuate cooperative benefits of high relatedness. To ensure these benefits are realised, parents and wider family pressure or force offspring into these cousin marriages. But why might offspring resist? Offspring suffer the costs of inbreeding depression, including genetic disorders and higher infant mortality, which will increase with each additional generation of cousin marriage (Bener and Mohammad, 2017; Dalzero et al., 2023). Whilst parents also suffer this cost to their reproductive success, as they are also related to their grandchildren, they may offset it by having other children marry exogamously.

This chapter tests whether consanguinity is associated with reports of honour killings, using the HRCP dataset of newspaper reports of honour killings from across Pakistan (see section 2.1.5 for a description of the dataset). Datasets drawn from media reports can suffer from a high degree of selection bias (Ortiz et al., 2006). Please see the section 6.2 for a more detailed discussion of selection bias. Identical to Chapter 6 I control for some sources of selection and use the same case-control method using the identically collected dataset on male suicide to act as the control group. I make the following prediction: districts where a higher proportion of marriages are consanguineous will report more honour killings.

7.3 METHODS

Data

Data on honour killings is sourced from the Human Rights Commission of Pakistan (HRCP). Please refer to sections 3.4 and 6.3.1 for a full description of the dataset and how the data is collected. Identically to Chapter 6, I use the full set of digitised data from 2015-2022 from the 4 provinces of Punjab, Sindh, Baluchistan, and Khyber Pakhtunkhwa. In contrast to Chapter 6 here I use two datasets of honour killings. The first is the full dataset containing all cases of honour killings where at least 1 woman was killed. The second dataset is a subset of the first dataset but contains only honour killings where the perpetrator and victim were related. This is because it can be difficult to define an honour killing. On the one hand, it could be defined as any murder where the violence is committed to protect the honour of a family or community (Gill, 2017). This would be in line with the definition used by the Metropolitan police (see section 1.3.3). On the other hand, others have defined honour killings as "an ancient practice in which men kill female relatives in the name of family honour" (Tripathi and Yadav, 2004) in which it is specified that the perpetrator is a male family member. Much of the historical literature emphasises the role of male agnates in perpetrating honour-based violence and Tillion's theory (Tillion, 1983) principally predicted an association between cousin marriage and honour killings that were perpetrated by kin. I run the analyses on both datasets for several reasons. Firstly, given the high rates of consanguinity in Pakistan there is a high probability that the perpetrator and victim are in fact related, even if the relationship is coded as a husband. Secondly, whilst a 'classic' honour killing may be that which occurs between relatives, behaving

honourably extends to behaviour within marriage. A wife's behaviour has implications for the honour of her husband's family and in-laws and adultery or suspected adultery is a common trigger for honour-based violence.

Data on consanguineous marriage, defined as a marriage between second cousins or closer, was taken from the Demographic Health Survey for Pakistan for the years 2012 and 2017. Each DHS cluster (see section 3.1.2 for a description of the DHS probability design) has a latitude and longitude which I assign to a district using the shapefiles of administrative regions of Pakistan downloaded from the Humanitarian Data Exchange (data.humdata.org) and the sf package in R (Pebesma, 2018). Then a proportion of all marriages that are consanguineous was calculated for each district. I combine the years 2012 and 2017 to calculate the proportion. This is for two reasons; firstly, it increases the sample size per district from which the proportions are calculated, therefore increasing the precision of estimates, and secondly, I do not know how old the victims were and am therefore unable to calculate a proportion from a specific birth cohort. Furthermore, it is not theoretically clear that calculating the proportion of marriages that are consanguineous for the birth cohort of the victims is the most appropriate measure. It could be that the amount of cousin marriage that has been occurring over several generations is what is relevant for the strength of an honour culture. All other covariates were taken from the Pakistan census, conducted in 2017, apart from night-time luminosity which was taken from the geographic covariates available from the DHS for the year 2017.

Analytic Design

Identically to Chapter 6, I adopt a case-control study to partially address the high degree of selection bias present in the dataset. I use the HRCP dataset on male suicides to act as the control cases, given that the data collection method is identical to that of the dataset on honour killings. Please see section 6.3.2 for a full discussion of the rationale for this method.

As mentioned in section 6.3.2 sample selection can introduce collider bias if both the exposure and the outcome of interest influence the likelihood of being reported in the dataset (Schuessler and Selb, 2023). If a district that begins to report honour killings subsequently starts reporting more because of a positive feedback loop, this may in turn affect selection. Secondly, the proportion of consanguinity in an area could also affect selection if areas of high relatedness tend to have tightly-knit communities that are unlikely to report honour killings. I keep the possibility of a spurious association generated by collider bias in mind going forward.

What causes high levels of consanguinity may also confound any association I find if it is also causally related to honour killings. Because consanguineous marriage can have financial benefits, it is often associated with poverty. Whilst historically, it was common amongst the richer families, to conserve wealth and status, it appears now to be most common amongst poorer families, often as a means to save money and find marital partners (Bittles and Black, 2010b). For example, evidence from Bangladesh suggests that when financial constraints relax, many families opt instead for exogamous

marriage (Mobarak et al., 2013). Poverty may also drive honour killings since poverty is a common cause of other violent behaviours (Crutchfield and Wadsworth, 2003). There is no direct district-level measure of poverty, but we can use lack of education as a proxy. Here I use the proportion of the literate population over 10 years of age who did not complete primary education. Like Chapter 6 I also include the district population size, the night-time luminosity, the proportion of the population living in an urban area, and the number of police stations at the division level.

7.4 RESULTS

The sample consists of the same 105 districts as Chapter 6 that reported any honour killings or male suicides from the 4 provinces described above. These districts exhibit an extremely wide range of consanguineous marriage from 34% to 86% of all marriages surveyed being between second cousins or closer. Across the whole sample, the overall percentage of marriages that are consanguineous is 55.5%. Figure 7-1 presents a heat map and bar chart of the proportion of marriages that are consanguineous across 28 divisions of Pakistan. The highest rates of cousin marriage are concentrated in Sindh and Baluchistan, although there is no area where consanguinity is low.

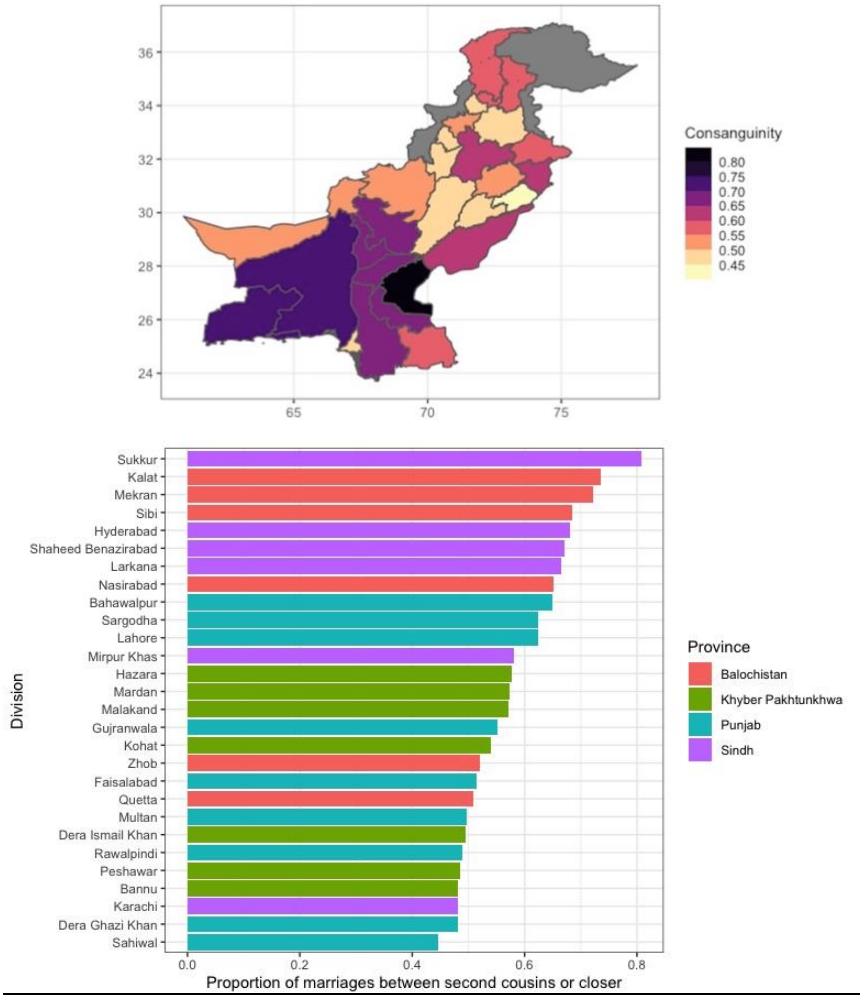


Figure 7-1 Heat map and bar chart of the proportion of marriages that are consanguineous (between second cousins or closer) per division.

The sample consists of 7731 cases of honour killing where at least one woman was killed. Of these 31% (2,373) were perpetrated by husbands or exes and 30% (2,337) were by related family (Table 7-1). See table 6-1 in Chapter 6 for a more detailed breakdown. For many of the cases the relationship between victim and perpetrator was unknown.

Table 7-1 Perpetrators of honour killings N (%)

Perpetrator of Honour Killings				
Husband/ Ex	**Relatives**	**Other**	**No info**	**Total**
2373 (31%)	2337 (30%)	967 (13%)	2054 (27%)	7731 (100%)

I find no association between consanguineous marriage and the odds of reporting an honour killing (Table 7-2). All the odds ratios are close to 1, meaning that there is no difference in the odds of reporting an honour killing compared to a male suicide, when the proportion of marriages that are consanguineous increases by 1 standard deviation. This is the case for all derivations of the model including models that only included honour killings perpetrated by related kin.

Table 7-2 Odds ratios and confidence intervals for multi-level logistic regressions presenting the odds of reporting an honour killing compared to the odds of reporting a male suicide. Model 1 contains all cases of honour killings and Model 2 only those that were perpetrated by related kin. Models 1 and 2 are then further divided into two models, one that contains all the cases reported and one that contains only cases from districts where at least 20 total cases of honour killings and suicide were reported. Models are controlled for the district level population, night-time luminosity, the proportion of the population that is living in urban areas, the proportion of the population over 10 that never completed primary school, the proportion of property that is owned by women, and the sex difference in literacy. Models also control for the number of police stations at the division level.

	Model 1 All honour killings		**Model 2** Perpetrated by related kin	
	Whole dataset	Districts >20 cases	Whole dataset	Districts >20 cases
Proportion of marriages that are consanguineous	1.01 (0.84-1.21)	1.02 (0.84-1.24)	0.95 (0.77-1.18)	0.96 (0.77-1.19)
Observations	18429	18242	13073	12978
District	105	80	104	80
Division	28	25	28	25
Province	4	4	4	4

7.5 DISCUSSION

I find no evidence that district-level consanguinity marriage rates are associated with reports of honour killings in Pakistan, in contradiction to the hypothesis. This is inconsistent with previous research that found that genetic measures of cousin marriage did associate with the odds of justifying honour-based abuse cross-culturally (see section 5.4). However, it is in line with other research specific to Pakistan that found that consanguinity did not associate with other honour-related proxies such as whether a woman was employed outside the home or whether a woman thought it was justified to be physically abused if a wife went out without telling her husband (see section 5.6). I

discuss two potential reasons for the results here. Firstly, the relationship between consanguinity and honour may be asymptotic. Secondly, the level of aggregation used is not meaningful, and we could be committing an ecological fallacy.

I have argued previously (see section 5.5) that there may be an asymptotic relationship between cousin marriage rates and honour killings. One type of asymptotic relationship occurs when one variable approaches a constant value (asymptote) as the other variable approaches infinity or zero. Or, in real-world terms, it is a relationship where as one variable reaches a certain value, this no longer results in a proportional increase in the second variable. In this case, it is possible that as cousin marriage rates approach their limit it no longer corresponds to a significant increase in honour crimes. The reason for this asymptotic behaviour could be that achieving female subservience may become increasingly easier as cousin marriage increases, therefore negating the need for punishment via honour crimes. If areas of high levels of consanguineous marriage are those that are the strictest, with tight-knit communities easily able to police behaviour, then women may become unlikely to 'misbehave'. For example, Khan (2006) highlights how the most conservative areas in Pakistan can often have very low rates of honour killings due to the strict observance of honour-related rules such as purdah. This claustration minimises both the desire and opportunity to resist the system. Evidence from Bangladesh suggests that women do find consanguineous marriages to be more oppressive, stating that they would often have to "keep quiet" and were unable to make demands (Shenk et al., 2016). Therefore, the system of normative control can function without enacting extreme punishment at high levels of consanguinity. These areas may also be those that are the least likely to report an honour killing for fear of destabilising a tight knit community. It is also important to remind ourselves that honour killings are the most extreme extension of honour-based violence, and there are many other forms of control, such as female claustration or less extreme forms of violence that are sufficient to police behaviour. These forms of non-fatal honour-based violence are not reported as they are not considered a crime or worth involving the police in. Even if they were to be reported to the police, they would be unlikely to make it into the mainstream media due to a lack of public appetite for a minor violent event.

The dynamics of the evolution of punishment can also help to explain why we might see an asymptotic relationship. As discussed in section 2.3, high rates of consanguineous marriage could produce the high strength of ties and low mobility that can stabilise third-party punishment (Roos et al., 2014). Secondly, once punishment has evolved it is highly stable, if the cost of cooperation is lower than the cost of being punished (Gardner and West, 2004). In terms of honour killings, if areas with high levels of consanguinity are those where the costs of punishment are high, then the rational response for a woman is to cooperate or be submissive. The cost of punishing itself then decreases as defectors become rare, since punishment itself becomes less frequent (Boyd et al., 2003), arguably then showing up in the sample as lower reports of honour killings.

If cooperation is less costly than being punished, then this will translate into reduced female resistance. Whilst this does not alter the structure of patriarchy, it will allow women to gain the most favourable terms within that particular context. Evidence from Bangladesh suggests that women do find consanguineous marriages to be more oppressive, stating that they would often have to "keep quiet" and were unable to make demands (Shenk et al., 2016). Additionally, some scholars state that the subsection of society in Pakistan with the fewest honour killings are the richer conservative classes, who are able to practise stricter forms of female seclusion and purdah, thereby increasing the costs of resistance and lowering the likelihood of extreme punishment (Khan, 2006). One must, however, keep in mind that the absence of resistance is not a sign of an absence of repression. Sexual conflict, in the evolutionary sense, can still be occurring even if there is no overt conflict (Kokko and Jennions, 2014).

This study examines associations between an aggregate level proportion of consanguineous marriage at the district level and individual level outcomes. As mentioned in Chapter 6, aggregate-level data is often criticised due to theoretical issues with the appropriateness of the level of aggregation (Pollet et al., 2017). Here I am assuming that the level of aggregation of the measure of cousin marriage constitutes a meaningful measure of an individual's environment – that the district-level proportion of cousin marriage is associated with an individual within that district's likelihood of marrying a cousin and experiencing a 'stricter' honour culture. As mentioned in Chapter 6 the population size of adults aged 15-49 among the districts I sample ranged from 44,207 to over 8.5 million with a mean of 876,458, which is arguably too large a population to constitute a meaningful local environment. Within those districts, there could be variation between areas in consanguinity. As such, I could be committing an ecological fallacy due to the level of aggregation, where associations at a lower, potentially more meaningful level, could be different. One such fallacy is Simpson's paradox, where there may be a positive relationship between two variables within a group, but when data from multiple groups are combined the relationship reverses or disappears. It is possible that at lower levels of aggregation, we may find an association.

Overall, whilst an asymptotic relationship is possible, the empirical results show no association between cousin marriage and honour killings in Pakistan, and this is consistent with the results presented in section 5.6 for Pakistan. However, results presented in 5.4 indicate that there is an association between consanguinity and honour-based violence between groups. Part of the confusion could be due to inconsistencies in the theory in terms of what level of aggregation we would predict to see a relationship. Do we expect to see a relationship between cousin marriage and the risk of honour-based violence at the level of the individual, the village, the district, or the ethnic group? I return to this question in Chapter 8 for the final discussion.

CHAPTER 8: CONCLUSION AND DISCUSSION

In this thesis, I have empirically tested a novel hypothesis proposing an association between cousin marriage and honour cultures, with reference to ethnolinguistic groups and countries of the Greater Middle East. The hypothesis that there may be an association between cousin marriage and honour was first put forward by Germaine Tillion in 1983. Tillion noted that societies that practised patrilateral parallel cousin marriage also strictly controlled the marriage choices and sexual behaviour of individuals, particularly women, through norms of honour and honour-based violence. This topic fits within the broader scholarship of extensive versus intensive kinship where transitions to intensive kinship societies have been found to occur with the adoption of the more intensive economies of agro-pastoralists compared to hunter-gatherers, explained by the greater requirement of large-scale cooperation produced by kin-selection (Walker and Bailey, 2014). Indeed, this is in line with the hypothesis raised in section 2.2.2 that cousin marriage was adopted to coordinate decision-making between kin in pastoral groups (Keddie, 1990). More recently, intensive kinship has been used to explain cross-cultural variation in psychological traits and economic development (Bahrami-Rad et al., 2022; Schulz et al., 2019). This thesis contributes to this broader research area by examining how intensive kinship might affect the status of women and women's risk of violence, itself fitting within the broader discipline of Darwinian feminism and the question of why some parts of the world are more patriarchal than others (section 1.1). This final chapter will provide a brief overview of this thesis' findings, followed by a discussion of ecological analyses and fallacies, and lastly a discussion of future directions.

8.1 OVERVIEW OF FINDINGS

Humans demonstrate remarkable variation in their desire and ability to subjugate and control the behaviour and sexuality of women. The part of the world that has been the focus of this thesis has sometimes been referred to as the patriarchal belt (Caldwell, 1978; Kandiyoti, 1988), due to its particularly limiting restrictions on female behaviour through codes of honour. I have argued that patrilateral parallel cousin marriage, as part of a wider overall pattern of within-lineage endogamy, may have been instrumental in the emergence of the patriarchal belt. I briefly review the results below.

Chapter 4 demonstrated that at the individual level being married to a cousin may be protective of intimate-partner violence, fitting with an evolutionary framing that being surrounded by kin should increase female bargaining power, and the qualitative and ethnographic research outlined in section 2.2.3 that explored how cousin marriage may increase female status. However, Chapter 4 did not show that those married to their cousins experienced more natal family violence, although there was important variation in the associations between violence and subtypes of cousin marriage. By contrast, Chapter 5 demonstrated a relatively robust positive association between cousin marriage and honour-based violence across ethnic groups, and between regions within countries. Whilst

Chapter 6 provided evidence that honour killings may be responsive to marriage market imbalances like skewed sex ratios, Chapter 7 found no evidence that they are responsive to variation in district rates of cousin marriage. The inconsistency in the results, particularly between Chapters 4, 5 and 7, points to the question raised at the end of Chapter 7: do we expect to see a relationship between cousin marriage and risk of honour-based violence at the level of the individual, the village, the district, the ethnic group, or the country?

8.1.1 Ecological Fallacies, Selection Bias, and Measurement Differences

Ecological fallacies can occur when factors that are associated with rates of a behavioural outcome at an aggregate level are assumed to also associate with the behavioural outcome at the individual level. Often these associations do not hold at the individual level because of the many further forms of bias that can occur at the cross-cultural level compared with studies of individuals within a population. As a result, some fields, such as epidemiology, have largely rejected ecological and cross-cultural research, instead making use of longitudinal and case-control studies. However, population-level studies can still be useful for a handful of reasons. Firstly, because they remain a key component in the cycle of hypothesis testing and generating further theory and testable hypotheses. Secondly, many risk factors for disease or behavioural outcomes do operate at the population level (Pearce, 2000). Human behavioural ecology is the study of how ecology affects the behaviour of individuals but often what we are interested in is group-level emergent cultural properties such as large-scale cooperation, the inheritance system, or the development of an honour culture. Many of these questions are cross-cultural questions and it is the task of well-developed theory to hypothesise as to what level we expect to see associations.

In Chapters 1 & 2 I did not properly address this question, but I return to it here to explain why the results found in Chapters 4 and 5 may not be inconsistent with each other. Chapter 4 tested whether an individual being married to a cousin was a risk factor for natal family violence, whereas Chapter 5 examined this question cross-culturally. Theoretically one may well not expect the association to hold at the individual level. The theory posits that there is some degree of parent-offspring conflict over cousin marriage or intensive kinship, and this drives honour-based violence. However, if an individual has agreed to marry their cousin, then the opportunity for conflict has already passed. Therefore, it is unlikely that women married to their cousins would report more honour-based violence since they are the women who have cooperated. Therefore, the data suffers from selection into the marriages. Interestingly, previous research that was able to disaggregate between low-consent marriages and high-consent marriages, found that women in low-consent cousin marriages had a significantly higher risk of honour-based violence (Payton, 2015). Was I able to examine the level of consent in marriages in the DHS sample of Chapter 4 I may have found more nuanced results. Additionally, the genetic data and the measure of honour-based beliefs used in Chapter 5 are much better-quality variables

than the measure of one generation of cousin marriage and proxy variable of honour-based violence used in Chapter 4.

However, these contradictory results are also consistent with the possibility of selection: areas where women are treated poorly are more likely to adopt cousin marriage. This can produce the results above where cross-culturally the practice looks detrimental, but at the individual level, women married to their cousins have improved outcomes. This is found to be the case with Pakistani watta satta marriages, exchange marriages where brothers exchange sisters as brides (Jacoby and Mansuri, 2010). Watta satta marriages are argued to protect women from mistreatment as it establishes a mutual threat across the marriages – what you do to my sister, I will do to yours. However, within Pakistan, areas that have high rates of watta satta tend to have poorer outcomes for women in general, producing an image of a harmful cultural practice. Controlling for selection into the practice indicates that women in watta satta marriages are much less likely to receive domestic violence (Jacoby and Mansuri, 2010). Whether dynamics such as these are also driving the association between cousin marriage and honour is one direction for future research.

Lastly, these contradictory results also require a discussion of the different measures used across the thesis. Firstly, when comparing our key predictor of cousin marriage, Chapters 4 and 7 used survey data that reflects the amount of cousin marriage that occurred across the generations represented in the survey, which usually spans two to three generations. By contrast, Chapter 5 used a genetic measure of runs of homozygosity that allowed me to calculate a more granular measure of the extent to which a population has been practising cousin marriage over several generations. This is arguably a better measure as it is less vulnerable to generational fluctuations in rates of cousin marriage that depend on factors such as wealth and urbanisation (Bittles, 1994; Hamamy et al., 2005). Secondly, the theory presented in Chapter 2 is mostly couched in historical terms to explain why honour cultures have emerged in this part of the world since pre-Islam. As such, the measure of greater relevance is the amount of cousin marriage that was going on historically, which a genetic measure captures better.

Secondly, when comparing our key outcome of honour-based violence the proxies or direct measures differ between the chapters. Chapter 4 uses a proxy measure of natal family violence, Chapter 5 uses a normative statement as to whether or not honour killings are justified, and Chapters 6 and 7 use newspaper reports of actual honour killings. This has important implications for the results. The survey in Chapter 4 asked people to report actual violence that they had received from natal family members. This is likely to suffer from a significant amount of under-reporting for several reasons. Firstly, if the violence that they are being asked to report is a crime they may be fearful of incriminating someone. Secondly, social desirability bias can cause respondents to conceal the truth or say things in line with what they believe the interviewer wishes to hear. Thirdly, individuals may be particularly unlikely to report violence from their close family members in fear of damaging their relationships. Fourthly, the large majority of the women interviewed no longer lived with their natal

family yet were being asked to remember historical events, which may have occurred many years ago. This can bias results towards more severe events which are more memorable. Lastly, this measure did not ask individuals what the trigger for the violence was and there may well be a significant amount of violence that women in Jordan face from their natal family that has little to do with honour.

By contrast, asking individuals about their attitudes towards violence allows them to express what the norm is without incriminating themselves in ever having committed or received violence. However, these normative questions may still suffer from social desirability bias, for example, respondents may exaggerate their support for gender equality (Lawson et al., 2021). In comparison to attitudinal questions, the indicator used in Chapters 6 and 7 of media reports of actual honour killings is a more direct measure, yet it suffers from a significant amount of reporting bias, which Chapter 6 discusses in detail. Overall, the measures on attitudes are likely to suffer from the least amount of underreporting and may reflect the most accurate measure of the strength of an honour culture.

8.1.2 The Cultural Evolution of Honour

Not only did this thesis test a hypothesis at multiple levels, but it also tested the hypothesis at multiple time points. Chapter 4 drew from contemporary Jordanian data collected between 2007 and 2017 and Chapter 7 spanned media reports from 2015-2022. By contrast, Chapter 5 combined a genetic measure of cousin marriage that captured a measure of cousin marriage over many generations, with a contemporary survey measure of beliefs around the justification of honour killings. This raises a second theoretical question: at what point in time would we expect to see an association between cousin marriage and honour?

Historically cousin marriage may have been instrumental in the emergence of the type of honour culture common to the Greater Middle East, where most honour killings were perpetrated prior to marriage between kin. However, this may no longer be the case. In other words, once a norm of honour becomes established it can exist independently from what originally caused its emergence and evolve beyond its original 'function' (Du and Mace, 2018). Rates of cousin marriage are decreasing globally (Bittles, 1994; Islam, 2018; Shenk et al., 2016) yet it is unclear whether honour cultures are relaxing or whether honour-based violence is decreasing. As societies urbanise further and become integrated into the global economy, we will likely see further decreases in intensive kinship practices.

The cultural inheritance of honour-based norms can continue long after the cause is gone and can continue to be culturally transmitted via processes such as conformity bias. Similarly, once honour becomes an institutionalised norm it is conceivable that individuals will use it as an excuse to punish female behaviour that extends beyond what may originally have been considered honour-relevant behaviour. Indeed, some of the newspaper reports that made up the samples of Chapters 6 and 7 contained examples where police or reporters struggled to distinguish between femicide by husbands that constitutes an honour killing and femicide that does not. For example, one report of a husband

killing his wife states that the police thought it would be "premature to say it was an honour killing incident. Preliminary information indicates the incident occurred over a domestic dispute". At the same time, domestic disputes could also be understood as arising out of a threat to male honour. Similarly, stories abound from urban Morocco and Egypt, of women grappling with the contradictions of societies that still place great symbolic value on honour and respectability, at the same time as tacitly condoning the liberal sexual norms of pre-marital sex and adultery that occurs with mixed-sex higher education and the growing anonymity of urban centres (Slimani, 2020; Wynn, 2018).

8.2 Future Directions

At the beginning of section 8.1.1, I proposed that it is the task of a well-developed theory to hypothesise where and when we might see associations. This is this thesis' greatest limitation: I have relied on relatively untested and unreliable verbal theory to build the hypotheses and research questions. At the same time, this is also this thesis' strength: I have made a first step into relatively unchartered water that examines the relationship between kinship intensity and the treatment of women. It also means that there are many future avenues from which to take this thesis.

The benefits of cousin marriage

One of the central assumptions of the theory outlined in Chapter 2 was that there were particular benefits to patrilateral parallel cousin marriage compared to either cross-cousin marriage or exogamy. However, these remain largely untested. To truly understand why individuals, lineages, and kinship groups have this preference and why, in some instances, they enforce it, we need to better understand the costs and benefits. One major gap is that we do not truly understand how the emergent social structural properties differ between the two types of cousin marriage. Therefore, future research will examine how relatedness and wealth consolidation differ or not between types of cousin marriage, using agent-based models. Early work presented at the European Human Behaviour and Evolution Association Conference in 2023 by Alejandro Perez-Velila and myself indicated that cousin marriage did prevent wealth escape. However, this did not differ by cousin marriage type and all else being equal, cross-cousin marriage and patrilateral parallel cousin marriage were equally able to prevent wealth escape as each other, indicating that wealth consolidation may not be the principal driver of this practice. Going forward, many of the assumptions made in Chapter 2 about the benefits of cousin marriage should be empirically or mathematically tested.

In terms of relatedness, understanding how different preferences for cousin marriage and the rate at which they occur affect group relatedness, is essential to understanding the dynamics of cooperation and conflict in a society (see section 1.2.3). The system of intensive kinship I described in Chapter 2 is one of both intense cooperation and competition, which is in line with the insights of Grafen and Taylor that the benefits of increased relatedness can be cancelled out by the cost of increased

competition (Grafen, 1984; Taylor, 1992a). Dynamics such as these have been used to explain other 'harmful' cultural practices such as religious celibacy, where parents suffer the 'cost' of forcing one child to become celibate to alleviate competition between brothers and other related group members (Micheletti et al., 2022b; Zhou et al., 2022). Understanding how this relates to populations practising preferential cousin marriage an important next step for future research.

Honour-based violence against men

This thesis principally examined honour-based violence against women, with the exception of Chapter 5. Future work should more fully incorporate the role of men as both perpetrators and victims of violence. Examining the differences between honour cultures that direct violence towards men rather than women, as is the case in parts of Albania, the Southern United States, and Alaska (Hasluck, 2015; Hoebel, 1970; Nisbett and Cohen, 1996), may generate further testable hypotheses as to why violence is directed at one sex over the other. For example, ethnographic evidence from Alaska suggests that in instances of community punishment for transgressions such as serial murder, the community will force the kinsmen of the criminal to execute him to prevent the establishment of a blood feud (Boehm, 2011; Hoebel, 1970). A similar phenomenon could well be occurring in areas where violence is directed at women whereby the community forces the kinsmen to punish a woman for behaviour that would have harmed the group. Indeed, community is essential to concepts of honour and without it, there can be no public opinion on the matter and no feelings of shame. Of course, this can be presented as a group, cultural group, or multi-level selection argument (Boyd and Richerson, 2005; Henrich, 2004; Wilson et al., 2023), which has been critiqued due to individual-level selection often argued to be able to undermine group selection, but also because kin selection itself is often able to explain higher level institutions or norms (Kay et al., 2020; Kramer and Meunier, 2016; Lehmann et al., 2022). Either way, conflict may be occurring between the individual and a wider group, rather than just parent-offspring conflict, as I have mostly presented here.

Further examination of the costs and benefits of raising sons compared to daughters, as outlined in section 1.2.4, may also aid in understanding the sex bias in receipt of honour-based violence. If we are to believe that much of the Greater Middle East was subject to constant low-level warfare (Barth, 1986; Murphy and Kasdan, 1959; Robertson Smith, 1885) then this could have produced a female-biased sex ratio, making males the more desirable sex to raise and increasing the costs of raising daughters.

Indirect questioning methods

Given the issues outlined in section 8.1.1 with the use of proxies of honour-based violence and attitudes towards violence, future work should also engage with indirect questioning methods. Indirect methods, such as the list experiment, allow researchers to elucidate hidden support for a given harmful culture practise, as has been demonstrated for intimate partner violence (Gibson et al., 2020). Other methods include asking participants what they think others in the community believe,

rather than what they themselves believes. This has the potential to reduce social desirability bias even further and can even lead to some counter-intuitive results such as individuals underestimating the amount of support there is for gender equality in a community (Lawson et al., 2024, 2021).

Applicability beyond the sample

03/06/2024 09:49:00There are regions and populations of the world which would be classified as honour cultures yet where cousin marriage is either of the cross-cousin type, is rare, or is proscribed. This includes, for example, the Southern United States of America, Southern Italy, many Latin American groups and some Inuits (Boehm, 2011; Cottino, 1999; Nisbett and Cohen, 1996; Uskul and Cross, 2020). The question thus arises as to whether cousin marriage is the only driver of honour-based violence, or rather, what produces honour cultures in these regions that have little cousin marriage? One principal difference between the principally Middle Eastern honour cultures featured in this thesis, and those listed above, are the degree to which honour-based violence is directed towards men or women and the extent to which the perpetrators are related to the victim. The theory explored in Chapter 2 of this thesis that formed the basis of our hypotheses was principally concerned with how to explain honour related violence directed towards *woman* and perpetrated by *blood kin*. This is fundamentally different from the honour literature that has instead focused on the Americas where honour-based violence tends to occur between men, such as that that is exhibited in gang cultures (Nisbett and Cohen, 1996; Uskul and Cross, 2020). That is not to say that women are not involved in these types of honour cultures, indeed the behaviour of women, particularly around sex are still fundamental to concepts of honour and they may receive violence as a result of behaving dishonourably. Large amounts of femicide occur across the world and are often tied to conceptions of honour. However, these are rarely perpetrated by biologically related individuals and are more often perpetrated by intimate partners in so called 'crimes of passion (Campbell et al., 2007). Ultimately, I cannot extrapolate beyond the sample that has been used in this thesis but this question of the generalisability of the theory is likely a fruitful future research avenue. Examining the extent to which our hypotheses hold in other parts of the world could be combined with the section above that proposes examining the different ecological underpinnings of honour-based violence that is directed at men versus women.

8.3 Final Remarks

In this thesis, I hope to have made some important empirical contributions to the literature on kinship intensity and the evolution of patriarchy. Sensitive topics, such as honour-based violence are difficult to study and require the combination of multiple data sources that vary in their quality and their bias, and I have made a best attempt at analysing these data sources here. Sensitive topics also require additional thought when it comes to the dissemination of results, particularly where they might be used by individuals with Islamophobic, anti-women, or other harmful agendas. In April of 2023 I

organised and hosted a workshop on researching sensitive topics in the quantitative social sciences at UCL. The workshop aimed to bring together experts from multiple disciplines and from the policy and charity sector to discuss three broad and related questions: 1) how should researchers approach the ethics of studying sensitive topics? 2) How can we measure and collect accurate data? 3) how should researchers frame and present results? Our speakers included both qualitative and quantitative researchers as well as experts from the charity sector such as Maheen Pracha from the Human Rights Commission of Pakistan and Paul Stockley from Stop Child Witchcraft Accusations. Themes that emerged from the workshop was how the notion of what constitutes a sensitive topic often changes through time and within different cultural contexts. Secondly, that where we can, researchers should aim to conduct studies that can inform practitioners working on the ground or studies that can enhance the conversation and debate around sensitive topics. Furthermore, it will be important when the chapters of this thesis are published that they are accompanied by layman's pieces that engage the wider public and challenge any malign use of the research.

Overall, the thesis has tackled a small piece of the puzzle of the emergence of honour cultures - that of whether cousin marriage is associated with honour, to which I believe I have provided evidence in support. Overall, there is much yet to test and uncover and I look forward to a fruitful research agenda going forward.

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APPENDICES

APPENDIX A: SUPPLEMENTARY INFORMATION FOR CHAPTER 4

Table A1

Table A1: Odds ratios (OR) and 95% confidence intervals (CI) of univariate multi-level logistic regressions, clustered at the regional level, of consanguineous marriage on the odds of reporting violence from A) a Husband or B) a natal family member. *p<0.05, **p<0.01,

	Model A: Violence from husband OR (95% CI)	Model B: Violence from natal family OR (95% CI)
Ref: Unrelated	0.93	0.96
Patrilateral cousin	(0.85-1.03)	(0.86-1.08)
Matrilateral cousin	0.90	0.81**
	(0.78-1.02)	(0.69-0.95)

Table A2

Table A2: Odds ratios (OR) and 95% confidence intervals (CI) of univariate multi-level logistic regressions, clustered at the regional level, of consanguineous marriage broken down into its further constituent types on the odds of reporting violence from A) a Husband or B) from a natal family member. *p<0.05, **p<0.01, ***p<0.001

	Model A: Violence from husband OR (95% CI)	Model B: Violence from natal family OR (95% CI)
Ref: Unrelated	0.73	0.85
Double 1st parallel cousin (D1P)	(0.52-1.03)	(0.56-1.30)
Double 1st cross cousin (D1C)	0.71 (0.47-1.09)	0.88 (0.54-1.43)
Patrilateral parallel (PP)	0.92 (0.80-1.07)	1.01 (0.85-1.19)
Patrilateral other (PO)	0.99 (0.87-1.12)	0.95 (0.82-1.10)
Matrilateral parallel (MP)	0.86 (0.71-1.04)	0.80 (0.64-1.01)
Matrilateral other (MO)	0.93 (0.79-1.09)	0.82* (0.67-1.00)

Table A3

Table A3: Odds ratios (OR) and 95% confidence intervals (CI) of multi-level logistic regressions with consanguinity broken down into its further constituent types. Model A considers the odds of reporting violence from a husband, model b the odds of reporting violence from a natal family member and model C is the odds of justifying violence from a husband. **p<0.05 ** p<0.01 ***p<0.001*

	Model A: Violence from husband OR (95% CI)	**Model B: Violence from natal family** OR (95% CI)	**Model C: Justification of violence from husband** OR (95% CI)
	Models are controlled for survey year, age at marriage, age, polygyny, education, wealth, urban/rural living, number of children, and employment		
Ref: Unrelated **Double 1st parallel cousin**	0.67* (0.45-0.98)	0.84 (0.54-1.40)	1.26 (0.95-1.65)
Double 1st cross cousin	0.75 (0.48-1.16)	0.86 (0.52-1.42)	0.99 (0.71-1.38)
Patrilateral parallel	0.83* (0.71-0.97)	1.00 (0.84-1.19)	1.11 (0.98-1.26)
Patrilateral other	0.92 (0.80-1.05)	0.95 (0.81-1.11)	1.03 (0.93-1.15)
Matrilateral parallel	0.87 (0.71-1.06)	0.81 (0.64-1.02)	1.02 (0.87-1.19)
Matrilateral other	0.97 (0.82-1.16)	0.84 (0.68-1.04)	1.09 (0.94-1.25)

Table A4

Table A4: Odds ratios (OR) and confidence intervals (CI) of multi-level logistic regressions with interaction terms between consanguinity type and survey year on the odds of reporting violence from A) a husband or B) A natal family member. *p<0.05, **p<0.01, ***p<0.001

	Model A: Violence from husband OR (95% CI)	Model B: Violence from natal family OR (95% CI)
	Models are controlled for age at marriage, age, polygyny, education, wealth, urban/rural living, number of children, and employment	
Ref: Unrelated Double 1st parallel cousin (D1P)	0.54 (0.25-1.14)	1.16 (0.64-2.13)
Double 1st cross cousin (D1C)	0.90 (0.41- 1.98)	0.57 (0.22-1.45)
Patrilateral parallel (PP)	0.68* (0.49-0.93)	0.93 (0.67-1.27)
Patrilateral other (PO)	1.03 (0.79-1.32)	1.01 (0.77-1.33)
Matrilateral parallel (MP)	0.82 (0.54-1.25)	1.00 (0.65-1.53)
Matrilateral other (MO)	0.87 (0.61-1.23)	1.11 (0.78-1.58)
Ref: 2007 2012	1.05 (0.91-1.20)	0.99 (0.85-1.14)
2017	0.65*** (0.56-0.76)	0.25*** (0.21-0.30)
D1P X 2012	2.04 (0.72-5.84)	0.43 (0.13-1.41)
D1C X 2012	0.84 (0.28-2.49)	1.75 (0.52-5.90)
PP X 2012	1.19 (0.80-1.76)	0.95 (0.64-1.41)
PO X 2012	0.78 (0.57-1.08)	0.84 (0.60-1.19)
MP X 2012	1.06 (0.64-1.75)	0.71 (0.42-1.20)
M0 X 2012	0.91 (0.59-1.42)	0.66 0.42-1.03)
D1P X 2017	1.11 (0.43-2.88)	0.63 (0.21-1.87)
D1C X 2017	0.72 (0.24-2.14)	2.18 (0.58-8.14)
PP X 2017	1.54* (1.01-2.35)	1.82* (1.11-2.97)
PO X 2017	0.99 (0.69-1.42)	1.21 (0.75-1.94)
MP X 2017	1.06 (0.59-1.91)	0.88 (0.39-1.97)
M0 X 2017	1.69* (1.06-2.69)	0.60 (0.20-1.26)

Figure A1

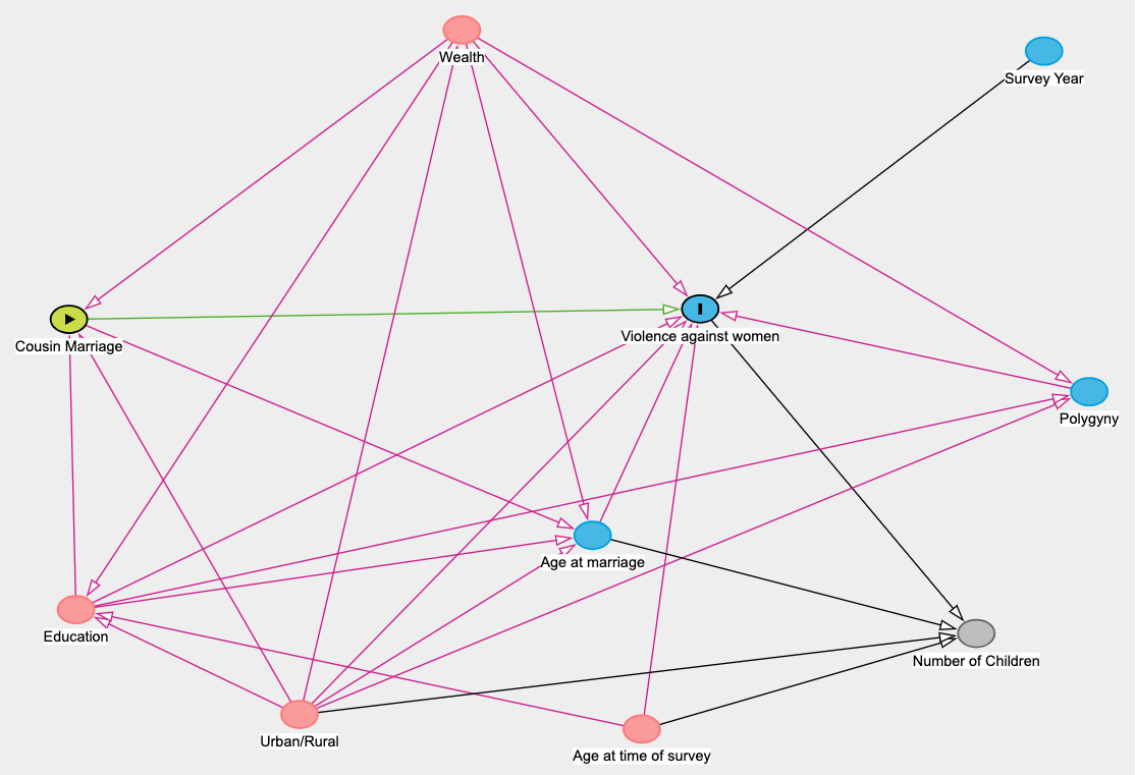

Figure A1: Directed acyclic graph (DAG) presenting hypothesised causal relationships between variables included in analysis (Table 4-3). Adjusting for all covariates is an appropriate adjustment set for estimating the direct effect of cousin marriage on violence against women. Pink variables indicate that they are ancestors of both the exposure (cousin marriage) and the outcome (violence against women), aka potential confounders. Blue variables indicate that they ancestors of the outcome. Gray variables are other.

Figure A2

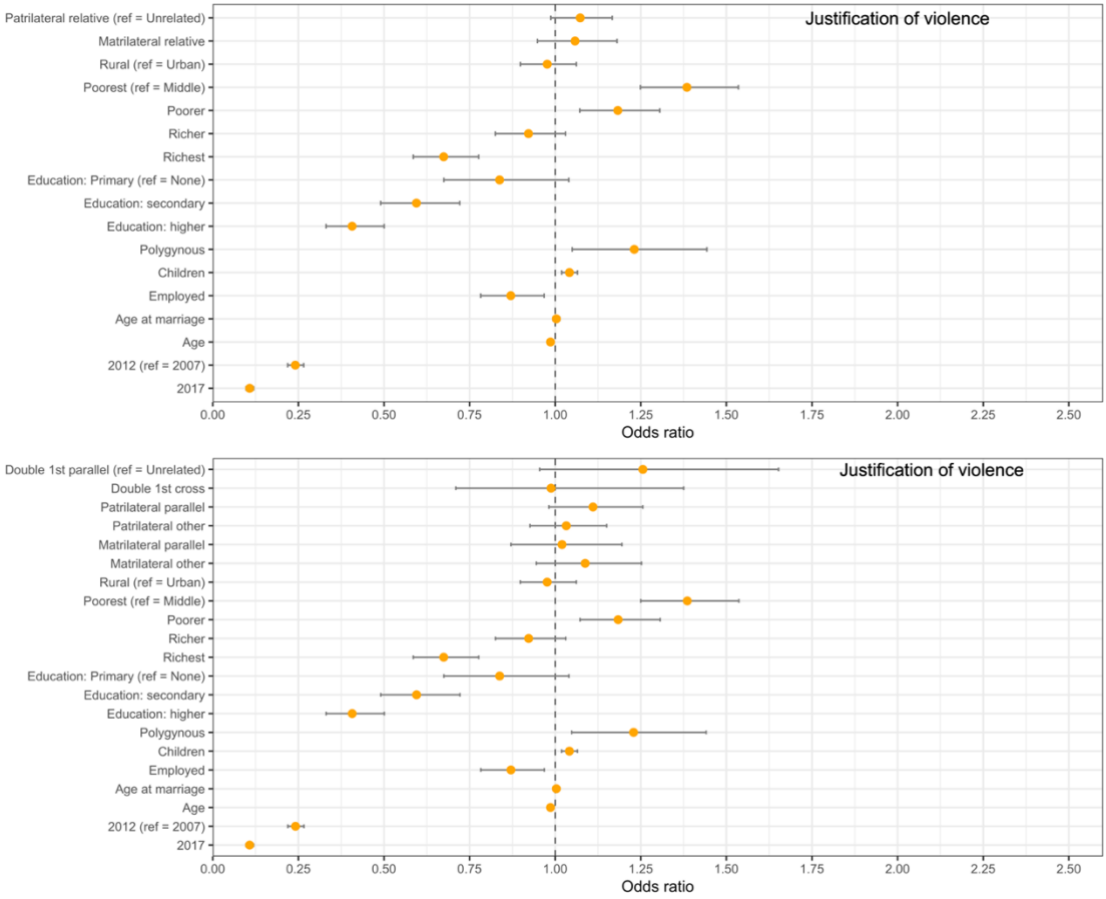

Figure A-2 odds ratios and confidence intervals from multi-level logistic regressions on the odds of justifying physical violence from a husband. The top plot breaks consanguinity down into patrilateral and matrilateral and the bottom plot breaks it down into further constituent types.

Figure A3

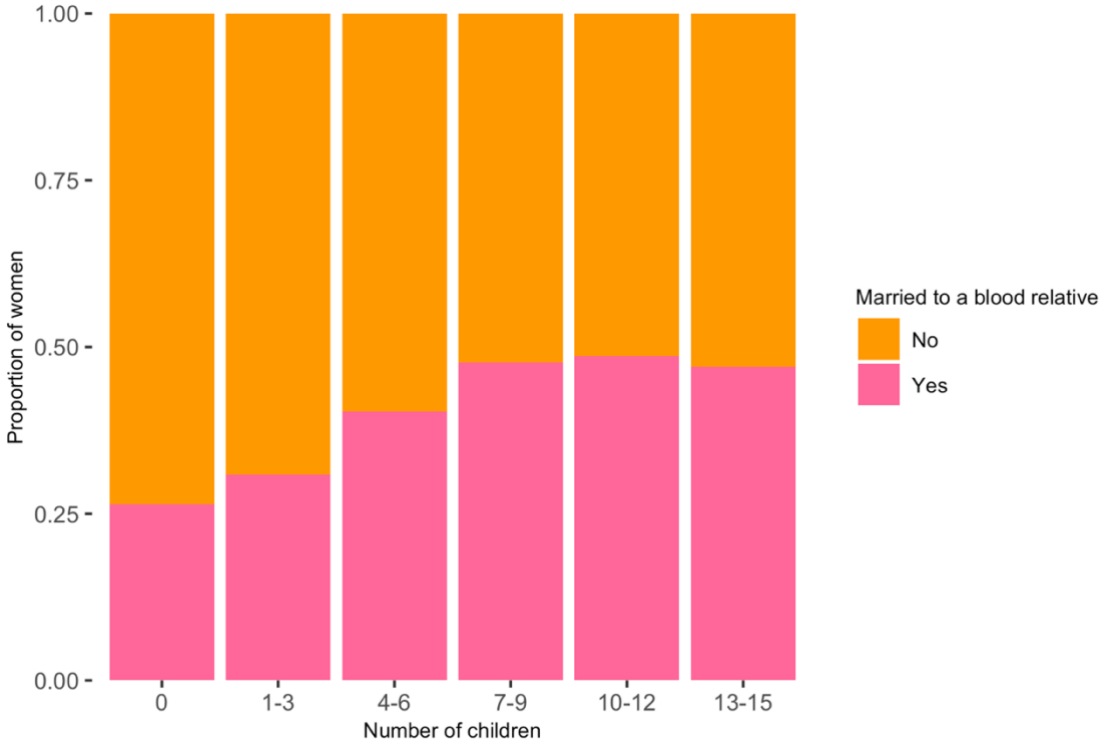

Figure A-3: Proportion of women who are married to a blood relative grouped by the number of children they have

APPENDIX B: SUPPLEMENTARY INFORMATION FOR CHAPTER 5

Kinship Intensity Index Calculations

Detailed information on the rationale for the kinship intensity index (KII) and how it is calculated can be found in the supplementary information of Schulz 2019 (Schulz et al., 2019). We detail the basic formulation of the KII here. The KII is made up of 5 sub-indicators that are argued to capture key dimensions of kinship intensity 1) cousin marriage preference 2) polygamy 3) co-residence of extended families 4) lineage organisation and 5) community organisation. Data is taken from D-PLACE (see www.d-place.org).

1. Cousin marriage preference. Variable EA026 in D-PLACE contains information on what type of cousin marriage is preferred, if any. This takes the value of 0 if cousin marriage is not preferred; 1 if second cousin marriage is preferred; 2 if cross cousin marriage is preferred; and 3 if parallel cousin marriage is preferred.
2. Polygamy. Variable EA009 in D-PLACE categorises societies as monogamous, occasional or limited polygyny and common polygyny, given a score of 0, 1, and 2 respectively.
3. Co-residence of extended families. Variables EA008 and EA012 make up this sub indicator. EA008 refers to domestic organisation and societies are given a score of 0 if they are organised in independent nuclear or independent polygamous families, 1 for minimal extent or stem families, 2 for small extended families and 3 for large extended families. EA012 codes for marital residence and societies are given a score of 0 for neolocality, 1 for ambilocality and 2 for either parilocality or matrilocality. The final score is the average of the score for EA008 and EA012.
4. Lineage organisation. Variable EA043 is used and societies are given a score of 0 for bilateral descent and 1 otherwise, which includes societies with duolateral, quasi-lineage and ambilineal descent.
5. Community organisation. Variable EA015 is used and societies are given a score of 1 if localised clans are present and/or if community endogamy exists and if both are absent the society is given a score of 0.

A mean is taken across the given sub indicators for each ethnic group/society. The KII is then standardised at the ethnicity level. Where any sub-indicators were missing, we used information from the electronic Human Relation Area Files (eHRAF), the most detailed ethnographic collection available to fill in any gaps.

Table B1: Matches used for ROH analysis.

Table B-1 Matches for ROH analysis

Pew Ethnicity	HO match	N	Lat, Long	Reason (Sources)	Country respondents were from
Albanian	Albanian	6	41.3, 19.8	Perfect match	Albania, Kosovo, Turkey
Algerian Arab	Algerian	7	36.8, 3	Perfect match	Algerian
Arab	BedouinB	19	31, 35	The early Arabs of the Arabian Peninsula were predominantly nomadic Bedouin pastoralists. (eHRAF, Encyclopaedia Britannica)	Afghanistan (7), Malaysia (1), Turkey (19)
Azerbaijani	Iranian	8	35.6, 51.5	Azeri's predominantly live in NW Iran or Azerbaijan. Both Azeris and Iranians practise cousin marriage, unlike Armenians and Georgians who are their other geographic neighbours. (Patai, 1955, eHRAF)	Azerbaijan, Russia, Kazakhstan, Krygyzstan, Uzbekistan
Balkarets	Balkar	10	43.5, 43.6	Perfect match	Russia
Balochi	Balochi	20	30.5, 66.5	Perfect match	Afghanistan, Pakistan
Bashkir	Kyrgyz	9	42.9, 74.6	Bashkir's and Kyrygz are both Kipchak Turkik groups and neither practice cousin marriage. (Yunusbayev et al., 2015, eHRAF)	Russia, Kazakhstan, Uzbekistan
Bengali	Bengali	7	23.7, 90.4	Perfect match	Bangladesh
Berber	Mozabite	21	32, 3	Mozabite is only Berber group in HO panel. Berber group common to southern Algeria. (Encyclopaedia Britannica)	Algeria, Morocco, Tunisia
Bosniak	Croatian	10	43.5, 16.4	Closest match geographically. Bosniaks and Croats share common language, have parallel kinship terminology, and are both exogamous and disprove of marriage between relatives. (eHRAF)	Bosnia and Herzegovina
Chechen	Chechen	9	43.3, 45.7	Perfect match	Russia, Kazakhstan
Circassian	Adygei	17	44, 39	Adyghe are also referred to as Circassions. Exogamy among the clan is strictly observed. (Joshua Project)	Russia
Djerma	Algerian	7	36.8, 3	Also called zarma, dyerma, branch of the songhai people. Among the Songhai noble firstborns are pressured to marry parallel cousins and cross-cousin marriage also permitted. Algerians are the closest genetic sample geographically and allow all types of first cousin-marriage and have a preference for FBD. (eHRAF)	Niger

Egyptian	Egyptian	18	31, 31.2	Perfect match	Egypt
Hausa	Algerian	7	36.8, 3	Closest genetic match geographically and both have preference for FBD cousin marriage (D-PLACE)	Niger
Hazara	Hazara	14	33.5, 70	Perfect match	Afghanistan, Pakistan
Hindko	Punjabi	8	31.5, 74.3	Hindko is a cover term for a diverse group of dialects, According to GlottoLog it's a Indo-Aryan language of the Greater Panjabic group. (Glottolog)	Pakistan
Iraqi Arab	Saudi/Syrian average	8/8	18.5, 42.5/ 35.1, 36.9	Iraq borders Saudi Arabia and Syria. All three countries practise cousin marriage with a preference for FBD marriage. (Patai, 1955b)	Iraq
Javanese	Thai	10	13.8, 100.5	Closest geographically. Javanese and Thai allow first cousin marriage. (D-PLACE)	Malaysia, Indonesia
Jordanian	Jordanian	9	32.1, 35.9	Perfect match	Jordan
Kabardinian	Adygei	17	44, 39	The Kabardians exist as the largest surviving 'tribe' of the northwestern Caucasus' Circassian language family. (The Adyghe are the other surviving Circassian major people group in the Caucasus.) - (Joshua Project)	Russia
Karakalpak	Kyrgyz	9	42.9, 74.6	Karakalpaks are a Turkik group, predominantly found in Uzbekistan. Exogamy is strictly observed when it comes to clans, but cousin marriage seems to be common according to iwpr: https://iwpr.net/global-voices/karakalpak-family-values. But this book: Variations on Uzbek Identity: Strategic Choices, Cognitive Schemas and by Peter Finke states otherwise, arguing that Karakalpaks do not practice cousin marriage. Descent is patrilineal. Uzbeks do practice a lot of close kin unions so probably not a good match. The Karakalpaks consider themselves closely allied to the Kazakhs - Kazakh marriage often highly endogamous for clans and lineages in areas in which hated Uzbeks, Uighur, and Tajiks were predominant. Kazakhs historically practiced cousin marraige but not parallel. Kyrgyz are exogamous. (Finke, 2014)	Uzbekistan
Kazakh	Kyrgyz	9	42.9, 74.6	Kyrgyz and Kazakh are both Muslim Turkik ethnic groups. Both, historically practices nomadic/semi-nomadic subsistence with livestock. Kazakhs seem to historically have practices more strict exogamy according to eHRAF - also trace descent through both male and female lines. Kyrgyz, on the other hand, trace descent strictly through the male line and appear to have been more endogamous in order to avoid marrying hates uzbeks. They do, however, intermarry often with Kazakhs indicating a degree of cultural similarity. (eHRAF)	Russia, Kazakhstan, Kyrgyzstan, Uzbekistan
Kumyk	Kumyk	8	43.3, 46.6	Perfect match	Russia

Kurdish	Iranian/Syrian/Turkish average	8/ 8/ 56	35.6, 51.5 /18.5, 42.5/ 37-41,27.5-39.7	Kurdish, an Indo-European language, is most closely related to Persian. Kurds predominantly live in contiguous areas of Iran, Iraq, Syria, and Turkey. Practice FBD marriage, women do not inherit (HRAF), polygyny. (D-PLACE, Encylopaedia Britannica)	Russia, Iraq, Kyrgyzstan, Turkey
Kyrgyz	Kyrgyz	9	42.9, 74.6	Perfect match	Russia, Kyrgyzstan, Tajikistan
Lebanese	Lebanese	8	33.8, 35.6	Perfect match	Lebanon
Lezghin	Lezgin	9	42.1, 48.2	Perfect match	Russia, Kazakhstan
Malay	Thai	10	13.8, 100.5	Glosest geographic match as Malaysia borders Thailand. Whilst both allow cousin marriage, neither have a preferred type of cousin. Both have bilateral descent, divorce is common, similar subsistence. (D-PLACE)	Malaysia
Moroccan Arab	Algerian	6	41.3, 19.8	Algerians and Moroccans belong to same Maghreb region, both Sunnis, speak similar dialect, both practice cousin marriage (D-PLACE)	Morocco
Muhajir	Sindhi	18	25.5, 69	Muhajir are Muslim immigrants of various ethnic groups and origins who migrated from India after the Partition. Mostly settled in urban Sindh. (Britannica)	Pakistan
Nuristani	Kalash	18	36, 71.5	Nuristanis are pre-Islamic group, forcibly converted in 1895, still practice pre-Islamic traditions. Kalash people are considered the heirs to this pre-Islamic culture. "Kalash culture and belief system differs drastically from the various ethnic groups surrounding them but is similar to that of the neighboring Nuristanis" - https://www.newworldencyclopedia.org/entry/Kalash	Afghanistan
Palestinian	Palestinian	37	32, 35	Perfect match	Jordan, Palestinian Territories
Pashayee	Pathan	19	33.5, 70.5	Also known as Pashayi or Pashai, many consider themselves Pashtuns speaking a special language. (Joshua Project)	Afghanistan
Pashtun	Pathan	19	33.5, 70.5	Perfect match	Afghanistan
Punjabi	Punjabi	8	31.5, 74.3	Perfect match	Pakistan
Pushto	Pathan	19	33.5, 70.5	Perfect match	Pakistan
Rifian	Mozabite	21	32, 3	Rifians are Berbers speaking Tarifit, Moroccan Berber	Morocco

Russian	Russian	22	61,40	Perfect match	Russia, Kazakhstan, Kyrgyzstan
Saraiki	Punjabi	8	31.5, 74.3	It's a language spoken by ~26 million people in Pakistan with the majority of them located in Punjab according to the 2017 Pakistan census	Pakistan
Sindhi	Sindhi	18	25.5, 69	Perfect match	Pakistan
Sonrai	Algerian	6	41.3, 19.8	Among the Songhai noble firstborns are pressured to marry parallel cousins and cross-cousin marriage also permitted. Algerians are the closest genetic sample geographically and allow all types of first cousin-marriage and have a preference for FBD. There is also a Songhai group in Algeria (Korandje – see Glottolog) (eHRAF)	Niger
Tabasaranets	Lezgin	9	42.1, 48.2	Tabasaranets is a Lezgian language, both groups exist in Dagestan. The Lezgins are closely related, both culturally and linguistically, to the Aghuls of southern Daghestan and, somewhat more distantly, to the Tsakhurs, Rutuls, and Tabasarans. Lezgins practice marriage within the clan which is patriarchal extended family. Marriage amongst Tabasarans is forbidden between families related by ritual kinship	Russia
Tajik	Tajik_Pomiri	8	37.4, 71.7	Perfect match	Russia, Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan
Tatar	Chuvash	10	56.1, 47.3	Tatar's are any member of several turkik speaking peoples. Usually means Volga Tatars who are the most numerous and live in Tatarstan. Chuvash are also a turkik ethnic group, native to the Volga region and the genetic sample is taken relatively close to Tatarstan (Encyclopaedia Britannica)	Russia, Kazakhstan, Kyrgyzstan, Uzbekistan
Thai	Thai	10	13.8, 100.5	Perfect match	Thailand
Tuareg	Mozabite	21	32, 3	Tuaregs and Mozabites are both Berber groups (eHRAF)	Niger
Tunisian Arab	Tunisian	8	36.8, 10.2	Perfect match	Tunisia
Turk	Turkish	56	37-41,27.5-39.7	Perfect match	Russia, Iraq, Kazakhstan, Kosovo, Kyrgyzstan, Turkey, Pakistan
Turkmen	Turkmen	7	42.5, 59.6	Perfect match	Russia, Afghanistan, Uzbekistan

Uighur	Uygur	10	44, 81	Perfect match	Russia, Kazakhstan, Kyrgyzstan, Uzbekistan
Uzbek	Uzbek	10	41.3, 69.2	Perfect match	Russia, Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan

Table B2: Matches used for KII analysis.

Table B-2 Matches used for KII Analysis

Pew Ethnicity	D-Place name	D-place ID	Reason
Albanian	Gheg	Ce1	Perfect match
Algerian Arab	Algerians	Cd12	Perfect match
Algerian Berber1	Mzab	Cc4	averaged to make the below Algerian Berber
Algerian Berber2	Kabyle	Cd4	averaged to make the below Algerian Berber
Algerian Berber3	Shawiya	Cd8	averaged to make the below Algerian Berber
Algerian Berber	average of cc4, cd4, cd8		average of the berber groups present in Algeria on Dplace
Arab	Average of Cj2 and Cj5	Cj2	average of the Arab groups that are Middle Eastern not North African. The Arab respondents this will refer to are those from Afghanistan and Turkey and a single respondent from Malay
Azerbaijani	Iranians	Ea9	Azeri's predominantly live in NW Iran or Azerbaijan. Both Azeris and Iranians practise cousin marriage.
Bashkir	Bashkir	ch12	Perfect match
Bengali	Bengali	Ef2	Perfect match
Bosniak	Serbs	Ch1	Closest geographically available ethnicity on D-Place and also closest linguistically - Bosnian and Serbian are extremely similar languages, almost indistinguishable. eHRAF mentions that neither Serbian muslims or Bosnian Muslims marry PP cousins, however - serbian muslims do marry cross cousins and bosnians are able to marry agnatic kin so long as the relationship cannot be traced.
Chechen	Chechen	Ci7	Perfect match
Djerma	Zerma	Cb20	Perfect match
Egyptian	Egyptians	Cd2	Perfect match
Hausa1	Zazzagawa Hausa	Cb26	averaged to make the below Hausa
Hausa2	Hausa Kanawa	Cb9	averaged to make the below Hausa

Hausa	average of Cb26 and Cb9		Average of the two Hausa groups available on D-Place
Hazara	Hazara	Ea3	Perfect match
Iraqi Arab	Syrians	Cj1	Iraq borders Syria. Both practise cousin marriage with a preference for FBD marriage
Javanese	Javanese	Ib2	Perfect match
Jordanian	Jordanians	Cj6	Perfect match
Karakalpak	Kazakh	Eb1	Karakalpaks are a Turkik group, predominantly found in Uzbekistan. Exogamy is strictly observed when it comes to clans, but cousin marriage seems to be common according to iwpr: https://iwpr.net/global-voices/karakalpak-family-values. But this book: Variations on Uzbek Identity: Strategic Choices, Cognitive Schemas by Peter Finke states otherwise, arguing that Karakalpaks do not practice cousin marriage. Descent is patrilineal. Uzbeks do practice a lot of close kin unions so probably not a good match. The Karakalpaks consider themselves closely allied to the Kazakhs - Kazakh marriage often highly endogamous for clans and lineages in areas in which hated Uzbeks, Uighur, and Tajiks were predominant. Kazakhs historically practiced cousin marriage but not parallel.
Kazakh	Kazakh	Eb1	Perfect match
Kumyk	Kumyk	Ci3	Perfect match
Kurdish	Kurd	Ci11	Perfect match
Kyrgyz	Kazakh	Eb1	Kyrgyz and Kazakh are both Muslim Turkik ethnic groups. Both, historically practices nomadic/semi-nomadic subsistence with livestock. Kazakhs seem to historically have practiced more strict exogamy according to eHRAF - also trace descent through both male and female lines. Kyrgyz, on the other hand, trace descent strictly through the male line and appear to have been more endogamous in order to avoid marrying hated Uzbeks. They do, however, intermarry often with Kazakhs indicating a degree of cultural similarity.
Lebanese	Lebanese	Cj7	Perfect match
Malay	Malay	Ej8	Perfect match
Moroccan Arab	Moroccans	Cd16	Perfect match

Moroccan Berber1	Zekara	Cd10	averaged to make the below Moroccan Berber
Moroccan Berber2	Berabers	Cd7	averaged to make the below Moroccan Berber
Moroccan Berber3	Riffians	Cd3	averaged to make the below Moroccan Berber
Moroccan Berber4	Shluh	Cd5	averaged to make the below Moroccan Berber
Moroccan Berber	avg of cd10, cd7, cd3, cd5		Average of the berber groups present in Morocco on Dplace
Muhajir	Sindhi	Ea1	Muhajir are Muslim immigrants of various ethnic groups and origins who migrated from India after the Partition. Mostly settled in urban Sindh
Nuristani	Nuristani	Ea5	Perfect match
Palestinian	Jordanian	Cj6	Geographically closest, both Arab groups, both practise first cousin marriage
Pashayee	Ghilzai	Ea11	Ghilzai are one of the largest Pashtun tribes - Pashtun, Pashayee, Pushto, Pathan are all ethnonyms
Pashtun	Ghilzai	Ea11	Ghilzai are one of the largest Pashtun tribes - Pashtun, Pashayee, Pathan are all ethnonyms
Punjabi	Punjabi	Ea13	Perfect match
Pushto	Ghilzai	Ea11	Ghilzai are one of the largest Pashtun tribes - Pashtun, Pashayee, Pathan are all ethnonyms
Russian	Russians	Ch11	Perfect match
Saraiki	Punjabi	Ea13	It's a language spoken by ~26 million people in Pakistan with the majority of them located in Punjab according to the 2017 Pakistan census
Sindhi	Sindhi	Ea1	Perfect match
Sonrai	Songhai	Cb3	Perfect match
Tajik	Hazara	Ea3	Tajik and Hazara are both Farsic languages and closely related. Both are Persian ethnic groups.
Tatar	Kazan tatar	ch20	Perfect match
Thai	Thai	Ej9	Perfect match
Tuareg	Udalan Tuareg	Cc13	Perfect match
Tunisian Arab	Tunisians	Cd21	Perfect match

Turk	Turks	Ci5	Perfect match
Turkmen	Turkmen	Eb5	Perfect match
Uzbek	Uzbek	Eb8	Perfect match

TABLES B3-B6: HONOUR KILLINGS AGAINST WOMEN

Table B3: Honour killing against a woman using the full sample ROH 0.5MB-10MB

		Odds Ratio (Confidence Interval)												
	Minimum length of ROH	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10
	Odds Ratio	1.17• (0.99-1.39)	1.25** (1.06-1.47)	1.27** (1.08-1.49)	1.28** (1.08 - 1.51)	1.29** (1.09 - 1.53)	1.30** (1.09-1.54)	1.31** (1.09-1.56)	1.32** (1.10-1.58)	1.32** (1.10-1.59)	1.33** (1.10-1.61)	1.36** (1.11-1.66)	1.37** (1.11-1.70)	1.40** (1.12-1.74)	1.42** (1.13-1.79)	1.45** (1.14 1.84)
Random Effect for Language Family		1.13 0.96-1.32	1.18* (1.00-1.39)	1.20* (1.01-1.41)	1.20* (1.01-1.42)	1.21* 1.02-1.44	1.22* 1.02-1.45	1.22* 1.02-1.47	1.23* 1.02-1.48	1.24* 1.02-1.49	1.24* 1.03-1.51	1.26* 1.03-1.55	1.27* 1.03-1.56	1.29* 1.03-1.61	1.31* 1.04-1.66	1.34* 1.05-1.70
	No. of observations	27182														
	No. of societies	50														

Table B-3 Odds ratios (OR) and 95% confidence intervals (CI) from multi-level logistic regression of average ethnicity-level F_{ROH} from 0.5Mb to 10mb on the odds of justifying an honour killing against a woman. All models include a random intercept for ethnicity. Individual level controls include sex, age group, education, urban/rural living, and religioisity. country level gdp is also controlled for. *** p<0.001 ** p<0.01 * p<0.05 • p<0.1

Table B4: Honour killing against a woman excluding Afghanistan, Iraq, and Uzbekistan

		Odds Ratio (Confidence Interval)												
	Minimum length of ROH	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10
	Odds Ratio	1.05 (0.87-1.26)	1.14 (0.95-1.37)	1.17 (0.98-1.40)	1.18 (0.99-1.42)	1.19 (0.99-1.44)	1.20 (0.99-1.44)	1.20 (0.99-1.46)	1.21 (0.99-1.47)	1.21 (0.99-1.49)	1.22 (0.99-1.50)	1.24* (1.00-1.54)	1.26* (1.00-1.58)	1.28* (1.01-1.62)	1.30* (1.01-1.67)	1.32* (1.02-1.7)
Random Effect for Language Family		1.01 (0.86-1.19)	1.06 (0.90-1.25)	1.07 (0.91-1.26)	1.07 (0.91-1.27)	1.08 (0.91-1.28)	1.09 (0.91-1.29)	1.09 (0.91-1.30)	1.09 (0.91-1.31)	1.10 (0.91-1.32)	1.10 (0.91-1.33)	1.11 (0.91-1.36)	1.12 (0.91-1.39)	1.14 (0.91-1.42)	1.15 (0.91-1.45)	1.17 (0.92-1.48)
	No. of observations	23415														
	No. of societies	43														

Table B-4 Odds ratios (OR) and 95% confidence intervals (CI) from multi-level logistic regression of average ethnicity-level F_{ROH} from 0.5Mb to 10mb on the odds of justifying an honour killing against a woman. Not including only respondents from Afghanistan, Uzbekistan or Iraq. All models include a random intercept for ethnicity.. Individual level controls include sex, age group, education, urban/rural living, and religiosity. country level GDP is also controlled for. *** p<0.001 ** p<0.01 * p<0.05 • p<0.1

Table B5: Honour killing against a woman using perfect matches only

		Odds Ratio (Confidence Interval)												
	Minimum length of ROH	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10
	Odds Ratio	1.06 (0.89-1.26)	1.08 (0.91-1.28)	1.08 (0.91-1.27)	1.07 (0.91-1.27)	1.08 (0.91-1.28)	1.08 (0.91-1.28)	1.08 (0.91-1.29)	1.08 (0.90-1.30)	1.08 (0.90-1.30)	1.09 (0.90-1.31)	1.09 (0.90-1.33)	1.10 (0.89-1.35)	1.10 (0.89-1.37)	1.11 (0.89-1.39)	1.12 (0.89-1.41)
Random Effect for Language Family		1.06 (0.89-1.25)	1.07 (0.90-1.21)	1.07 (0.90-1.27)	1.07 (0.90-1.27)	1.07 (0.90-1.28)	1.07 (0.90-1.28)	1.07 (0.89-1.29)	1.08 (0.89-1.30)	1.08 (0.89-1.30)	1.08 (0.89-1.31)	1.09 (0.89-1.33)	1.09 (0.88-1.35)	1.10 (0.88-1.37)	1.11 (0.88-1.40)	1.11 (0.87-1.42)
	No. of observations	18818														
	No. of societies	27														

Table B-5 Odds ratios (OR) and 95% confidence intervals (CI) from multi-level logistic regression of average ethnicity-level f_{ROH} from 0.5Mb to 10mb on the odds of justifying an honour killing against a woman. Including only respondents who self-reported ethnicities that could be perfectly matched to a genetic population. All models include a random intercept for ethnicity. Individual level controls include sex, age group, education, urban/rural living, and religioisity. country level gdp is also controlled for. *** p<0.001 ** p<0.01 * p<0.05 • p<0.1

Table B6: Honour killing against a woman removing Pashtun and Nuristani respondents

		Odds Ratio (Confidence Interval)												
	Minimum length of ROH	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10
	Odds Ratio	1.14 (0.96-1.35)	1.22* (1.04-1.44)	1.24** (1.06-1.45)	1.25** (1.06-1.47)	1.26** (1.06-1.48)	1.26** (1.07-1.50)	1.27** (1.07-1.51)	1.28** (1.07-1.53)	1.29** (1.08-1.55)	1.30** (1.08-1.56)	1.32** (1.09-1.61)	1.34** (1.09-1.64)	1.36** (1.10-1.69)	1.39** (1.11-1.74)	1.42** (1.13-1.79)
Random effect for Language Family		1.10 (0.94-1.28)	1.15• (0.98-1.35)	1.16• (0.99-1.37)	1.17• (0.99-1.38)	1.18• (0.99-1.39)	1.18* (1.00-1.40)	1.19* (1.00-1.42)	1.20* (1.00-1.43)	1.20* (1.00-1.44)	1.21* (1.01-1.46)	1.23* (1.01-1.49)	1.24* (1.01-1.52)	1.26* (1.02-1.56)	1.28* (1.03-1.60)	1.31* (1.04-1.64)
	No. of observations	26531														
	No. of societies	48														

Table B-6 Odds ratios (OR) and 95% confidence intervals (CI) from multi-level logistic regression of average ethnicity-level f_{ROH} from 0.5Mb to 10mb on the odds of justifying an honour killing against a woman. Excluding respondents who are Pashtun or Nuristani. All models include a random intercept for ethnicity. Individual level controls include sex, age group, education, urban/rural living, and religiosity. country level GDP is also controlled for. *** p<0.001 ** p<0.01 * p<0.05 • p<0.1

Table B7: Honour killing against a man using the full sample

		Odds Ratio (Confidence Interval)												
	Minimum length of ROH	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10
Odds Ratio		1.10 (0.93-1.31)	1.15 (0.97-1.37)	1.17• (0.98-1.39)	1.17• (0.98-1.40)	1.17• (0.98-1.41)	1.17• (0.98 1.41)	1.18• (0.97-1.42)	1.18• (0.97-1.44)	1.18 0.97-1.44)	1.18 0.96-1.45)	1.19 0.96-1.48	1.20 0.95-1.50	1.20 0.95-1.53	1.22 0.95-1.56	1.23 (0.95 - 1.59)
Random Effect for Language Family		1.09 0.91-1.29	1.14 (0.95-1.36)	1.16 (0.97-1.38)	1.16 (0.97-1.39)	1.16 (0.97-1.40)	1.16 (0.96-1.40)	1.16 (0.96-1.41)	1.17 (0.96-1.42)	1.17 (0.96 - 1.43)	1.17 (0.93-1.44)	1.18 (0.95-1.46)	1.18 (0.94-1.49)	1.19 (0.94-1.51)	1.20 (0.94-1.55)	1.21 (0.94-1.57)
	No. of observations	27261														
	No. of societies	50														

Table B-7 Odds ratios (OR) and 95% confidence intervals (CI) from multi-level logistic regression of average ethnicity-level F_{ROH} from 0.5Mb to 10mb on the odds of justifying an honour killing against a man across the whole sample. All models include a random intercept for ethnicity. Individual level controls include sex, age group, education, urban/rural living, and religiosity. country level GDP is also controlled for. *** p<0.001 ** p<0.01 * p<0.05 • p<0.1

	Odds Ratio (Confidence Interval)														
	Minimum length of ROH	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10
Random Effect for Language Family	Odds Ratio	0.97 (0.81-1.17)	1.04 (0.87-1.25)	1.07 (0.90-1.28)	1.08 (0.90-1.30)	1.09 (0.90-1.31)	1.09 (0.90-1.32)	1.09 (0.90-1.32)	1.09 (0.90-1.33)	1.10 (0.90-1.35)	1.10 (0.89-1.35)	1.11 (0.89-1.38)	1.12 (0.89-1.41)	1.13 (0.89-1.44)	1.14 (0.89-1.47)	1.16 (0.89-1.51)
		0.96 (0.80-1.15)	1.02 (0.85-1.22)	1.05 (0.87-1.26)	1.06 (0.88-1.27)	1.06 (0.88-1.29)	1.06 (0.88-1.29)	1.06 (0.87-1.30)	1.07 (0.87-1.31)	1.07 (0.87-1.32)	1.07 (0.87-1.33)	1.08 (0.86-1.35)	1.09 (0.86-1.38)	1.10 (0.86-1.41)	1.11 (0.86-1.44)	1.12 (0.86-1.47)
	No. of observations	23492														
	No. of societies	43														

Table B-8: Odds ratios (OR) and 95% confidence intervals (CI) from multi-level logistic regressions of average ethnicity level F_{ROH} from 0.5MB to 10MB on the odds of justifying an honour killing against a man excluding respondents from Afghanistan, Iraq and Uzbekistan. All models include a random intercept for ethnicity. Individual level controls include sex, age group, education, urban/rural living, and religiosity. country level GDP is also controlled for. *** p<0.001 ** p<0.01 * p<0.05 • p<0.1

Table B9: Honour killing against a man using perfect matches only

		Odds Ratio (Confidence Interval)											
	Minimum length of ROH	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10
	Odds Ratio	1.02 (0.82-1.26)	1.00 (0.82-1.22)	1.00 (0.82-1.22)	0.99 (0.81-1.21)	0.99 (0.81-1.22)	0.99 (0.81-1.22)	0.99 (0.80-1.22)	0.99 (0.80-1.23)	0.99 (0.79-1.23)	0.99 (0.79-1.24)	0.98 (0.78-1.25)	0.98 (0.77-1.26)	0.98 (0.76-1.27)	0.99 (0.75-1.29)	0.98 (0.74-1.31)
Random Effect for Language Family		1.01 (0.82-1.24)	1.00 (0.82-1.22)	1.00 (0.82-1.22)	1.00 (0.82-1.21)	1.00 (0.82-1.22)	0.99 (0.81-1.22)	0.99 (0.81-1.22)	0.99 (0.80-1.23)	0.99 (0.80-1.24)	0.99 (0.79-1.24)	0.99 (0.78-1.25)	0.99 (0.77-1.26)	0.99 (0.76-1.27)	1.00 (0.76-1.30)	0.99 (0.75-1.32)
	No. of observations	18892														
	No. of societies	27														

Table B-9 Odds ratios (OR) and 95% confidence intervals (CI) from multi-level logistic regression of average ethnicity-level Froh from 0.5Mb to 10mb on the odds of justifying an honour killing against a man. Including only respondents who self-reported ethnicities that could be perfectly matched to a genetic population. All models include a random intercept for ethnicity. Individual level controls include sex, age group, education, urban/rural living, and religiosity. country level gdp is also controlled for. *** p<0.001 ** p<0.01 * p<0.05 • p<0.1

	Odds Ratio (Confidence Interval)														
	Minimum length of ROH	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10
	Odds Ratio	1.03 0.87-1.21)	1.08 (0.92-1.27)	1.10 (0.94-1.30)	1.11 (0.94-1.31)	1.11 (0.94-1.32)	1.12 (0.94-1.32)	1.12 (0.94-1.33)	1.13 (0.94-1.35)	1.13 (0.94-1.36)	1.13 (0.94-1.37)	1.14 (0.94-1.39)	1.15 (0.94-1.42)	1.16 (0.94-1.44)	1.18 (0.94-1.48)	1.19 (0.94-1.50)
Random Effect for Language Family		1.03 0.87-1.21)	1.08 (0.92-1.27)	1.10 (0.94-1.30)	1.11 (0.94-1.31)	1.11 (0.94-1.32)	1.12 (0.94-1.32)	1.12 (0.94-1.33)	1.13 (0.94-1.35)	1.13 (0.94-1.36)	1.13 (0.94-1.37)	1.14 (0.94-1.39)	1.15 (0.94-1.42)	1.16 (0.94-1.44)	1.18 (0.94-1.48)	1.19 (0.94-1.50)
	No. of observations	26605														
	No. of societies	48														

Table B-10 Odds ratios (OR) and 95% confidence intervals (CI) from multi-level logistic regression of average ethnicity-level F_{ROH} from 0.5Mb to 10mb on the odds of justifying an honour killing against a man. Excluding Pashtun and Nuristani respondents. All models include a random intercept for ethnicity. Individual level controls include sex, age group, education, urban/rural living, and religioisity. country level gdp is also controlled for. *** p<0.001 ** p<0.01 * p<0.05 • p<0.1

Figure B1

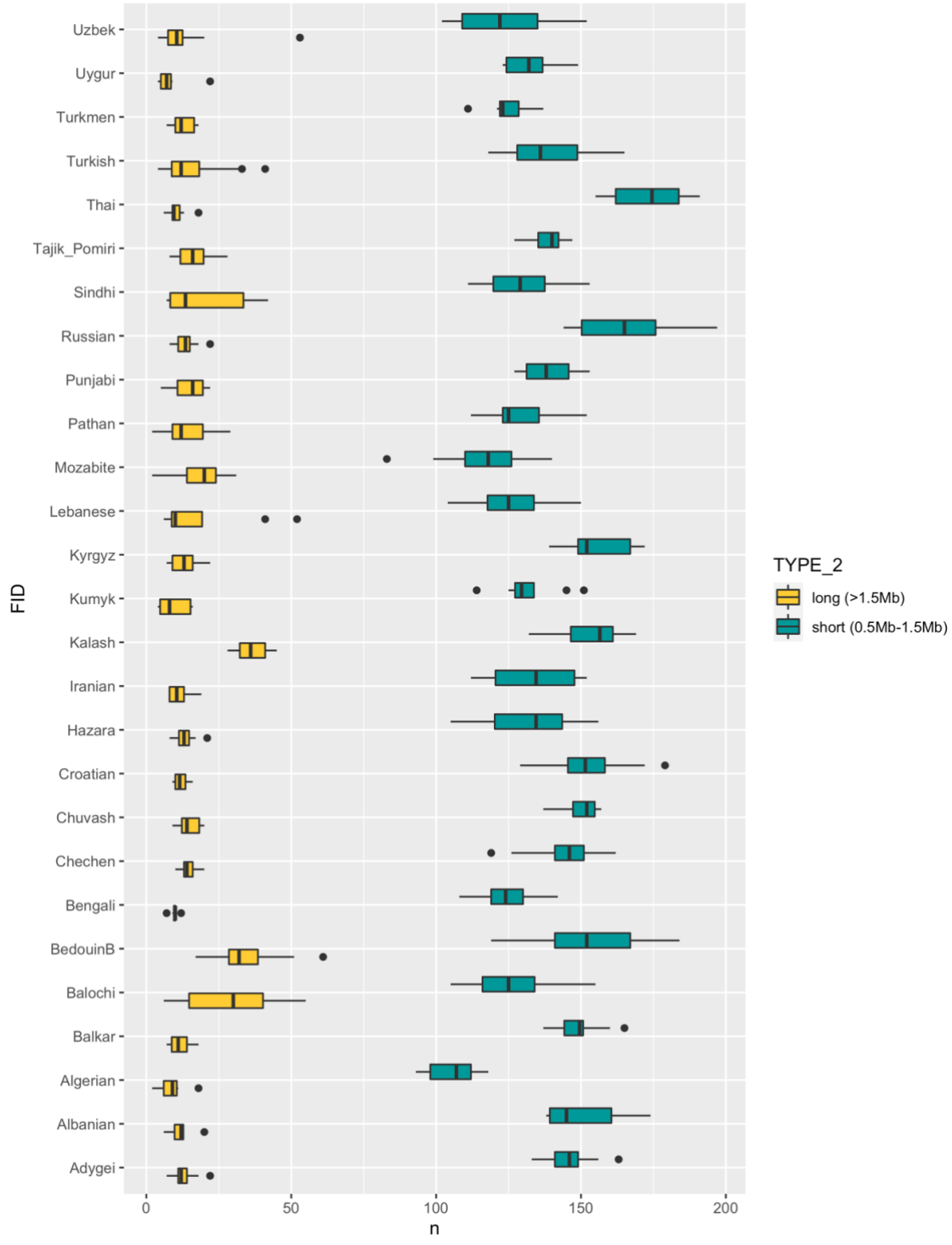

Figure B-1: Mean number of short (0.5mb-1.5mb) and long (>1.5Mb) Runs of homozygosity (ROH) for the individuals in the populations included in our study

Figure B2

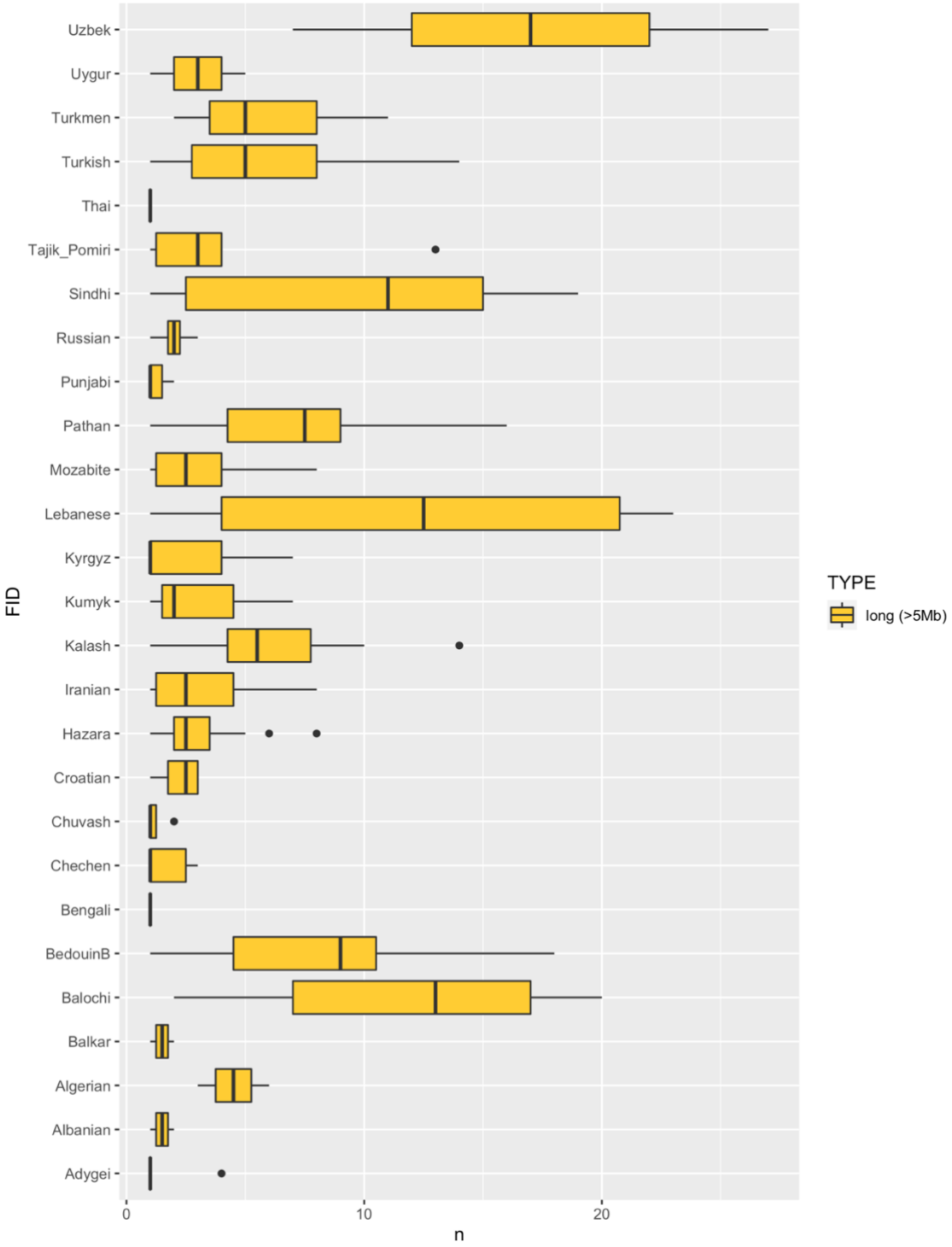

Figure B-2 Mean number of long (>5mb) Runs of homozygosity (ROH) for the individuals in the populations included in our study

APPENDIX C: SUPPLEMENTARY INFORMATION FOR CHAPTER 6

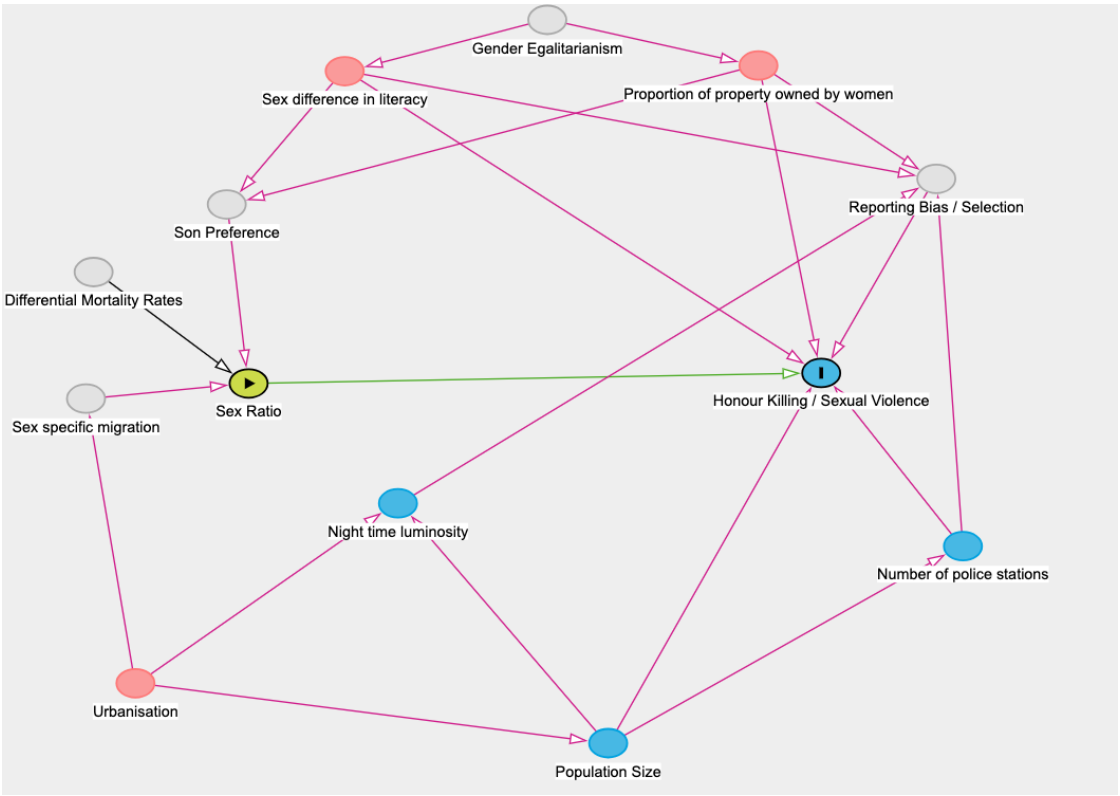

Figure C-1: DAG presenting the hypothesised causal pathways between variables included in the analysis (Table 6-2, Model 1). Pink variables are ancestors of both the exposure (sex ratio) and the outcome (honour killing), blue variables are ancestors of the outcome, green variables are ancestors of the exposure, and light grey variables are unobserved.