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'Missing girls' in historical Europe: reopening the debate

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ABSTRACT

Recent research argues that discriminatory practices unduly inflated female excess mortality during infancy and childhood in historical Europe. This article reviews the existing evidence by (1) evaluating the sources that can be used to study this phenomenon; (2) providing a state-of-the-art account of the prevalence of these discriminatory practices, as well as the factors that explain them; and (3) outlining a research agenda that could fill in the gaps in the literature.

KEYWORDS

Female excess mortality; sex ratios; infant and child mortality; gender discrimination; health

1. Introduction

In a short piece published in 1990, Amartya Sen famously warned that female excess mortality had resulted in more than 100 million women going 'missing' in South and East Asia (Sen, 1990). These dramatic numbers reflected the combined effect of sex-selective abortion and female infanticide, as well as deaths arising from gender-differential treatment in terms of the food and care provided during infancy and childhood. Underlying these practices was a strong son preference stemming from economic, social, and cultural factors that influenced the perceived relative value of women in these regions, an issue that has received considerable attention from both academia and the media (Anderson & Ray, 2010; Attane & Guilmoto, 2007; Das Gupta, 2017; Das Gupta et al., 2003; Iqbal et al., 2018). The analysis of the unbalanced proportions of men and women in Asia soon extended to Africa, the Middle East, and parts of the Caucasus (Guilmoto, 2022; Moghadam, 2020), thus making clear that the interest in the topic of 'missing girls' was not driven solely by concerns about gender inequality itself, but by an interest in fundamental questions about how societies function and flourish. The emerging recognition that gender equality has critical implications for economic development has subsequently led the international community to put girls' health and well-being at the centre of the world development agenda (World Bank, 2011; also Van Zanden et al., 2017).

However, the observed patterns of gender discrimination are not a recent phenomenon, and families have long relied on these practices as a way to control the number and the sex composition of their offspring (Bhaskar & Gupta, 2007; Dong & Kurosu, 2017; Drixler, 2012; Fenske et al., 2022; Gupta, 2014; Lee & Campbell, 1997; Mungello, 2008). Although sex-selective abortion was not possible for most of human history, female

infanticide and the mortal neglect of girls were prominent features of traditional societies, at least in India, China, and Japan. But, were there ‘missing girls’ in historical Europe?

The conventional narrative argues not only that there is hardly any evidence of this kind of gender discrimination in the European past (at least in the last few centuries), but also that there is no reason to assume that similar practices could have flourished and been sustained given the axial demographic, social and cultural principles that characterised European societies. According to this view, the European household formation system based on a high female age at marriage, a high percentage of the population being permanently celibate, and the prevalence of neo-local/nuclear households (the so-called European Marriage Pattern: EMP), acted as a crucial catalyst for higher levels of female agency, and for the favourable status enjoyed by women in historical Europe, at least relative to the rest of the world (Van Zanden et al., 2019; Lynch, 2011; De Moor & Van Zanden, 2010). At the same time, it is argued that the ethical and religious values ingrained in the dominant Christian creeds further limited female infanticide and the mortal neglect of young girls (Lynch, 2000, 2011; Viazzo, 2001, p. 179; Derosas & Tsuya, 2010).

This interpretation, however, is mostly based on a restricted definition of Europe (i.e., North-Western Europe), and therefore leaves out the experiences of many other regions (for controversies regarding the notion of EMP, see Dennison & Ogilvie, 2014; Szoltysek & Ogórek, 2020). Indeed, one of the central arguments behind reopening the investigation of ‘missing girls’ in historical Europe (and the main motivation for the articles included in this Special Issue) was the need to be much less cavalier in stressing the alleged absence of this type of gender discrimination on the basis of demographic data drawn from a rather thin and largely unrepresentative slice of European societies. Given the substantial increase in the amount of information available for many previously under-researched areas of Europe, as well as the expansion of the methods employed to make inferences from that evidence, we can no longer be content with the claim that there were no ‘missing girls’ in the European past, even if we take the influence of Christian ethics for granted.¹

Moreover, in a civilisation dominated by agriculture (Alesina et al., 2013), such as that of pre-industrial Europe, boys and girls must have had different values for their parents, which could have influenced the ways they behaved towards their children. Indeed, previous research has shown that, in 19th-century Europe, parents often treated their sons and daughters differently (Alter & Oris, 2000; Baten & Murray, 2000; Erlich, 1966; Horrell & Oxley, 2016; Johansson, 1984; Manfredini et al., 2016; McNay et al., 2005; Pinnelli & Mancini, 1997; Tabutin, 1978; Tabutin & Willems, 1998).² This evidence suggests that an unequal allocation of food, care, and/or workload negatively affected girls’ nutritional status and morbidity, which translated into shorter heights and increased mortality rates. Likewise, child abandonment was widespread, and, although the sex of the infant was not important for unwed mothers, poor married couples often preferred to abandon girls (Fuchs, 1984; Ransel, 1988; Kertzer, 1993).

These insights fit with the fact that women have suffered an inferior status in virtually all societies in the past (Amussen, 1988; Kok et al., 2017; Poska et al., 2013; Therborn, 2004). Early modern Europe was not different, even if there was substantial variation in the nature and the manifestations of this patriarchal bias (Hufton, 1998; Gruber & Szoltysek, 2016). While women faced only mild or moderate constraints on their agency in some

areas, in others they were largely subordinate to males both within the family and in public life. Therefore, the marginalised position of women, and the privileges accorded to male children for economic, social, and cultural reasons that were prevalent across preindustrial Europe, could have influenced the extent to which couples were willing to take certain steps – including female infanticide or post-natal mortal neglect – to prevent daughters from flourishing in the family, and in the broader society (Szołtysek et al., 2022b, this volume). Indeed, given that the remnants of a highly inequitable sex selection pattern of behaviour have recently been documented for some parts of contemporary South-Eastern Europe (see Guilmoto, 2022, this volume), it is reasonable to consider the possibility that such practices were more widespread across broader areas of the European landmass in the past.³

However promising the prospect of re-opening an investigation of missing girls in historical Europe may appear, we immediately stumble upon the fact that direct evidence of infanticide or the mortal neglect of female offspring in historical Europe is scarce at best. It is this lack of evidence that has long made studying the issue of infanticide or other extreme forms of violence against girls less appealing in the European context than in South and East Asia (see Das Gupta, 2022; this issue). However, the lack of evidence does not necessarily mean that such behaviours did not exist. Anecdotal evidence tends to be very scarce because, due to their very nature, individuals and families were likely to hide such practices. Likewise, given that infant mortality was extremely high, it is difficult to distinguish natural deaths from those resulting from infanticide or the mortal neglect of young girls (Derosas, 2012). Parents, especially married couples, could disguise those practices as natural deaths and many infants could have died from smothering, suffocation, irregular feeding, or exposure to cold (Derosas & Tsuya, 2010, p. 158). Families may have also deliberately killed their new-borns and reported them as stillbirths (Hanlon, 2016, p. 537). It is actually quite telling that court records on infanticides, which represent only a very small fraction of the actual phenomenon, hardly depict married couples (Gowing, 1997; Hufton, 1998, pp. 274–275). Assessing whether a child died from ‘natural’ causes or from neglect is even more difficult during infancy and childhood because we know very little about the extent to which parents allocated food and/or care to boys and girls differently. Sex-specific mortality rates are therefore likely to hide the effects of discriminatory practices.

Moreover, when scholars attempt to indirectly infer these phenomena from the conventional demographic material, they face considerable methodological challenges. In particular, the fact that males are biologically weaker than females complicates efforts to detect gender-discriminatory practices in high-mortality environments, such as those that existed in historical Europe, in which more boys than girls were dying for natural reasons, both in utero and during infancy and childhood (Beltrán Tapia, 2019). Therefore, assessing whether discriminatory practices were affecting sex-specific mortality rates requires finding an appropriate benchmark for comparison. This is especially clear if we look at the other side of this issue and, instead of deaths, we focus on the relative survival of boys and girls. In this regard, child sex ratios, the number of (surviving) boys per hundred girls, provide a measure of the cumulative impact of gender bias in peri-natal, infant, and child mortality, and, consequently, of the importance of (potential) discriminatory practices. However, while current (gender-neutral) child sex ratios (aged 0–4) revolve around 105–106 boys per hundred girls, this figure was significantly lower in the past due to the

biological female advantage that pushed child sex ratios down, sometimes well below 100 boys per hundred girls (Beltrán Tapia, 2019; Beltrán Tapia & Gallego-Martínez, 2017; Malein & Beltrán Tapia, 2022). Therefore, the lack of an appropriate benchmark for comparison appears to have prevented previous researchers from detecting the importance of this phenomenon.

Finally, if we are to proceed in our exploration and interpretation of this problem, we have to be willing to break what Guilmoto (2022, this volume) has referred to as the 'cultural taboo' of discussing the possibility that there was active gender discrimination in Europe. This idea also challenges the allegedly unique demographic and family features that characterised the European past, which have, in turn, been incorporated into theories of long-run growth that attempt to explain why the West became socially and psychologically peculiar and particularly prosperous (e.g., Van Zanden et al., 2019; also Henrich, 2020). According to this strand of the literature, the EMP weakened patriarchal authority over daughters, reduced son preference, improved women's property rights, encouraged female labour force participation, empowered widows, and created spousal equality – and, in due course, made women active agents in reducing fertility levels – all of which helped to fuel economic growth (Foreman-Peck, 2011; Hartman, 2004; De Moor & Van Zanden, 2010).⁴ Apparently, in that overarching story of the demographic uniqueness of Europe, there is little room for stark gender-discriminatory practices, even though this interpretation is clearly at odds with the substantial evidence that has been produced by gender historians since the heyday of women's studies in the 1970s (see also Dennison & Ogilvie, 2014, pp. 673–676).

Some scholars have already started questioning the existing narrative, and have called for re-opening the debate on 'missing girls' in historical Europe.⁵ By expanding the available evidence and the methodological toolkit, this new wave of studies has already shown that historical sex ratios can be fruitfully re-examined. A major outcome of this research has been to reveal the existence of 'missing girls' across many areas of historical Europe. For example, it has been shown that child sex ratios in Southern and Eastern Europe were abnormally high, especially during the 19th and the early 20th century (Beltrán Tapia, 2019; Beltrán Tapia & Gallego-Martínez, 2017). Using census micro-data from the NAPP and Mosaic Project, Szoltysek et al. (2022a) have further confirmed that some regional populations experienced unbalanced child sex ratios between the 18th and the early 20th century. Likewise, in-depth case studies have expanded the range of source materials, and have also detected the existence of missing girls in Spain, Italy, and Greece (Derosas, 2012; Echavarri, 2022; Marco-Gracia & Beltrán Tapia, 2021; Beltrán Tapia & Marco-Gracia, 2022a; Beltrán Tapia & Raftakis, 2022; Beltrán Tapia & Capelli, 2022). All of these studies have stressed that the interaction between son preference and economic deprivation affected girls' survival chances. The articles in this Special Issue further substantiate these earlier findings by showing that this behaviour was far more prevalent than was previously thought, and that it was even occurring in countries commonly considered to belong to the core European Marriage Pattern territories, like Denmark (Perner et al., 2022).

In this article, which also serves as an introduction for the Special Issue on 'Missing girls in historical Europe', we summarise some fundamental issues that have prepared the ground for these recent advances. We do so by (1) evaluating the sources that can be used to study this phenomenon, while putting special emphasis on the challenges they

present; (2) providing a state-of-the-art account of the prevalence of these discriminatory practices, as well as exploring the factors that may explain them; and (3) outlining the gaps in our knowledge so that they can be addressed in future research. In the first section, we examine the peculiarities of the sources that have been commonly employed in this kind of research (vital statistics, population counts, and church records). Apart from the biases that sex-specific under-registration and random noise may impose in these records, the interaction between the female biological advantage and the high-mortality environments existing in the past makes it difficult to find an appropriate benchmark to assess whether gender-discriminatory practices unduly inflated female mortality rates early in life. In addition, this section discusses the use of less conventional material (admission records from foundling hospitals, archaeological evidence, court records, anthropometric data, household budgets, etc.), and the value of exploring qualitative evidence to shed more light on the mechanisms behind these discriminatory practices.

In the next section, we summarise what we know about the extent of this phenomenon in historical Europe, both across space and over time, and we review the different explanations that have been put forward to explain these practices. Although the fraction of ‘missing girls’ appears to be higher in some areas in Southern and Eastern Europe, other regions with suspicious sex ratios can be found all over Europe. It should be stressed nonetheless that although female infanticide (or neglect right after birth) probably occurred in some locations, it appears that the ‘missing girls’ phenomenon in historical Europe was mainly the result of differential treatment during infancy and childhood. Framed within the resource constraints that these societies faced, son preference resulting in discriminatory practices was particularly prevalent in areas where the lack of female labour opportunities and particular familial configurations put girls at higher risk. While other cultural dimensions, as well as the special role assigned to males in conflict-prone areas, may have also contributed to these practices, the lack of research on these particular issues prevents us from drawing stronger conclusions. Finally, we conclude this article by outlining several avenues for further research.

2. Assessing whether there were ‘missing girls’ in historical Europe

The first step of any effort to address the existence ‘missing girls’ is to identify the relative importance of discriminatory practices that lead to inflated mortality rates, either right after birth or during in infancy and childhood. However, researchers studying this issue in historical populations face additional challenges. This section therefore outlines the sources and methodologies that scholars can employ, as well as the problems they may encounter when studying this phenomenon.

2.1. Sex ratios at birth

The relative number of male and female births is relatively regular, at least at the aggregate level. In most developed countries today where female infanticide or sex-selective abortion is negligible, the sex ratio at birth fluctuates around 105–106 boys per hundred girls (Chao et al., 2019; Hesketh & Xing, 2006). However, although the prevalence of female infanticide or neglect right after birth has been routinely assessed by comparing this figure to those that have been observed in the historical sources, we

have very little evidence of what the ‘natural’ sex ratio at birth would have been in the past (Visaria, 1967; Chahnazarian, 1990; Scalone & Rettaroli, 2015).⁶ Nevertheless, we know that the risk of miscarriage was high due to poverty and impaired maternal health (Woods, 2009). Given that males are biologically more vulnerable to harsh environments (Dipietro & Voegtline, 2017; Di Renzo et al., 2007), it is likely that more male than female foetuses were dying before birth.⁷ Therefore, the expected sex ratio at birth should be lower in the past than it is today.

The validity of this hypothesis is clearly visible in the (scarce) available data, mostly taken from parish and civil registers. Figure 1, which traces the evolution of sex ratios at birth in European countries between 1750 and 2015, suggests that this figure was indeed slightly lower in the past (close to 104; see also Van de Walle, 1974, p.49). Studying Scandinavian countries, Fellman and Eriksson (2011) show that sex ratios at birth were lower during the second half of the 18th century and the early 19th century, and rose steadily between then and the 1950s, a trend that is probably related to improvements in living standards. Nonetheless, the average sex ratios at birth plotted in Figure 1 should be considered a maximum threshold of what this figure would have been, because they are based on what is observed, thus potentially including observations from areas where female babies were actually being neglected (Beltrán Tapia & Marco-Gracia, 2022a; Beltrán Tapia & Raftakis, 2022; Derosas, 2012; Hanlon, 2016). It is also important to keep in mind that this estimation is based on a limited number of countries before 1850, so more efforts are needed to accurately assess what the ‘natural’ sex ratio at birth in the past actually was.



Figure 1. Sex ratios at birth in Europe, 1750–2015. Source: Human Mortality Database (HMD 2018). See also Beltrán Tapia & Marco-Gracia (2022a) and Beltrán Tapia & Capelli (2022).

Likewise, historical sources present additional complications when computing sex ratios at birth. For instance, the distinction between stillbirths and live births varied across regions, and changed over time (Scalone & Rettaroli, 2015). Therefore, births that were classified as stillbirths can include a varying number of neonatal deaths (or be counted as live births), depending on how live births were defined. This issue affects the benchmark for comparison because, as we discussed above, male babies were disproportionately likely to have been stillbirths (Rettaroli & Scalone, 2021; Ruii et al., 2022; Schneider, 2017; Woods, 2009). Another problem that arises when investigating historical sex ratios at birth is that parish records do not always include the date of birth, but instead provide the date of baptism. Given that males are also especially vulnerable during the first days of life, it is expected that more boys than girls died between birth and baptism. Therefore, the 'natural' sex ratio should be lower at baptism than at birth, and this discrepancy will widen with the time between these two events. Comparing parish records from different societies is also a challenge, given that baptism tends to happen right after birth in Catholic countries, whereas this interval is usually larger in Protestant countries (Minello et al., 2017).

In addition, parish records and early demographic reports often failed to register all births. If this issue especially affected female babies, the sex ratios at birth derived from these sources would overestimate the number of 'missing girls' due to neglect or infanticide. This is probably the most challenging issue that researchers face when trying to assess the prevalence of this phenomenon. Cross-checking with other sources, such as population census, is not always possible and such cross-checks would not eliminate all doubts because an individual may not show up in the population census if he or she migrated or died between the two counts. Therefore, researchers need to assess the quality of these records, which probably varied depending on a wide range of factors, including the way the community, the church, or the state organised this task (as well as the resources invested); the cost of registering a birth (including the opportunity cost); and the families' willingness to register their births.⁸ Nonetheless, it should be stressed that the under-registration of female births and the neglect of female infants are not mutually exclusive, as both phenomena may have been happening at the same time. Female under-registration, which reflects the lesser value of girls, could actually be a sign that more extreme forms of gender discrimination were also being practiced. Studying Spain between 1920 and 1950, Echavarri (2022) shows that high sex ratios at birth, regardless whether they were the result of under-registration or neglect, are linked to inflated female mortality rates during infancy and childhood.

The lack of qualitative evidence of female infanticide (see below) and the fact that the available evidence indicates that sex ratios at birth were not excessively unbalanced suggests that female infanticide explained only a small part of the 'missing girls' phenomenon in historical Europe. There were, of course, some exceptions, notably 19th-century Greece, where, according to both qualitative and quantitative sources, female babies were often neglected right after birth. There is also some evidence that female infanticide was common in France and Italy during the 16th-18th centuries, especially during difficult periods (Hanlon, 2016; Hynes, 2011); and even during the 19th century (Bechtold, 2002; Derosas, 2012). It has also been shown that periods characterised by economic difficulties were associated with the neglect of female infants right after birth in some rural areas in 19th-century Spain (Beltrán Tapia & Marco-Gracia, 2022a; Marco-Gracia & Beltrán Tapia,

2022b). As mentioned above, given the challenges associated with the use of these sources, further research is needed to substantiate these findings.

2.2. *Child sex ratios*

Population censuses and other enumerations offer an alternative way of looking at these issues. Given that the registration process in such sources is different, it does not suffer from the same limitations as parish registers and vital statistics. Unlike birth registration, which was the parents' responsibility, population counts were usually implemented by state (sometimes also church or manorial) agents that visited each household and collected information on all the individuals living there. As the registration process did not involve any payment and had minimal opportunity costs (at least compared to registering a birth), there were no incentives for the under-counting of children.

Moreover, analysing the number of surviving boys and girls at different ages allows to not only test the accuracy of sex ratios at birth, but also to assess whether discriminatory practices may have unduly affected female mortality rates during infancy and childhood. As with sex ratios at birth, the number of boys per hundred girls in different age groups is remarkably regular in the absence of gender discrimination. Therefore, comparing the observed figure to the expected (gender-neutral) sex ratio permits assessing the cumulative impact of gender bias in peri-natal, infant, and child mortality; and, consequently, the importance of discriminatory practices.

Historical child sex ratios, however, cannot be compared directly to modern ones. The biological frailty of males is observable not only in utero and around birth, but continues during childhood, and especially during the first year of life due to boys' greater susceptibility to infectious diseases (Drevestedt et al., 2008; Fischer et al., 2015).⁹ Therefore, more boys than girls would be expected to die in the high-mortality environments resulting from the poor living conditions, the lack of hygiene, and the absence of public health systems that characterised pre-industrial Europe. Recent research shows that infant and child sex ratios were indeed much lower in the past, even in the presence of gender-discriminatory practices, thus challenging previous ideas of what historical sex ratios should look like (Beltrán Tapia, 2019; Beltrán Tapia & Gallego-Martínez, 2017). These findings are depicted in Figure 2 (Panel A), which plots child sex ratios (aged 0–4) in Europe between 1750 and 2001 based on information on 25 countries.¹⁰ In France and the Nordic countries, for which we have information going back to the second half of the 18th century, child sex ratios were around 97–101 boys per hundred girls. This figure increased slowly during the 19th century, and rose more quickly after 1900 as living standards increased, a pattern that is shared across most Europe. Today, child sex ratios fluctuate around 104–106, thus almost mirroring the sex ratio at birth due to the extremely low levels of infant and child mortality.

Nonetheless, as historical sex ratios may reflect existing discriminatory practices, they provide only an upper benchmark of what gender-neutral sex ratios might have looked like in the past. Moreover, the previous graph mixes together the experiences of countries that underwent the demographic transition at different speeds. As explained above, higher infant mortality rates translate into lower child sex ratios, so this dimension should be considered when assessing how low historical sex ratios should be.¹¹ Therefore, Figure 2 also plots the relationship between child sex ratios and infant mortality rates

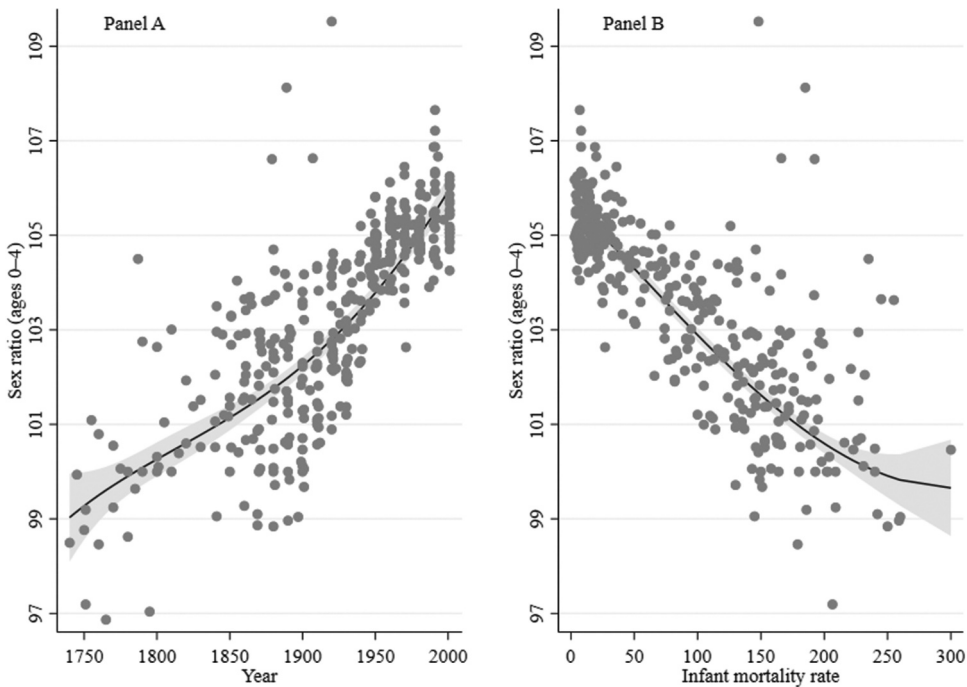


Figure 2. Child sex ratios (aged 0–4) in Europe, 1750–2001. Source: Mitchell (2013), Beltrán Tapia (2019), Beltrán Tapia & Raftakis (2022). The pattern depicted here remains virtually unchanged if the 5–9 age-group is used instead.

(Panel B).¹² Given that countries in North-Western Europe seem to have experienced lower levels of gender discrimination, the fitting line is computed based on the information available for those regions. The ‘natural’ child sex ratio is thus not a stable figure, but instead depends on the existing mortality rates. This finding allows predicting what the child sex ratios should look like depending on the mortality conditions, and therefore establishing a (gender-neutral) benchmark for comparison. In particular, while current child sex ratios fluctuate around 105 boys per hundred girls, the child sex ratio should have been around parity (100 boys per hundred girls) in societies where infant mortality rates were around 220 deaths (per 1000 live births).¹³ Again, given that these predictions are based on information about countries that may have treated boys and girls differently, these figures should be seen as a conservative estimate, as the ‘natural’ child sex ratio would have been even lower if gender-discriminatory practices were widespread.

The fact that infant and sex ratios were lower in the past allows re-examining historical sex ratios in a completely new light. In fact, it is likely that the lack of an appropriate benchmark for comparison prevented previous researchers from detecting the importance of missing girls in the past. Compared to the benchmark depicted in the previous figure, child sex ratios in Southern and Eastern Europe tended to be abnormally high, especially during the 19th and the early 20th century, which suggests that some sort of gender discrimination was leading to abnormally high female mortality rates at those ages (Beltrán Tapia, 2019). Although the timing varied by country, this pattern mostly disappeared either in the late 19th century or in the first decades of the 20th century. As

the data coverage for Eastern Europe in Mitchell (2013) is limited, it is not possible to make inferences about what happened in these regions during the 19th century. However, the NAPP/Mosaic dataset suggests that child sex ratios were excessively imbalanced in Eastern Europe as well between 1750 and 1950 (Szoltysek et al., 2022a).

In addition to examining variation in child sex ratios across regions and over time, looking at the evolution of sex ratios by age group can shed further light on these issues. There were indeed marked regional disparities in how the number of boys per hundred girls evolved as children got older (Beltrán Tapia, 2019, p. 8). For instance, English sex ratios were not only relatively low, they also showed a declining trend with increasing age. This finding is expected, because the female biological advantage would have resulted in more boys than girls dying 'naturally', which would have caused the sex ratio of the survivors to decrease (Coale, 1991, p. 519). To a greater or a lesser extent, the decline in sex ratios during the first years of life is a widely observed feature. Nonetheless, the increase in sex ratios starting with the 3–4 age cohort that is observed in some countries (i.e., France, Italy, Greece, Hungary, Serbia, Slovenia, etc.) is more difficult to explain, and again suggests that discriminatory practices against girls were increasing their mortality rates, probably via an unequal allocation of resources within families (Beltrán Tapia, 2019, p. 22).

It is well-known, however, that certain categories of individuals may have not been thoroughly registered in historical enumerations, especially children and infants (Szoltysek, 2015; United Nations, 1955). The poor, the unskilled, and the landless also sometimes went uncouned as they represented marginal and largely fluid elements of the society. It is plausible that, in patriarchal-patrilineal societies where females were less valued, census takers simply ignored many female children as essentially unimportant for the purposes of the survey, thus leading to high child sex ratios (the "numerical masculine superiority", see Coleman, 1976, p. 56). However, as already mentioned, there were no particular incentives to under-register girls in census enumerations. If anything, the perception (real or imagined) that censuses were used for tax and military purposes would have created incentives to conceal the male members of the population at both the community and the household level. It can indeed be argued that families had more incentives to under-register boys so that they were not conscripted later on (Szoltysek, 2015, vol. 2; Sala-Vives & Pujadas-Mora, 2021, p. 290). This concern was probably stronger in regions that were suffering from endemic violence or conflicts.¹⁴ A similar argument can be made for the enumerations that were undertaken for tax purposes, and in which the number of males determined the amount of tax that would be exacted at either the familial or the council level.¹⁵ Moreover, under-registration mostly affected infants. Thus, even if more female than male infants escaped enumeration, girls should have appeared in the censuses as they grew up. Hence, older age groups should have been less prone to under-registration, and lower sex ratios would therefore be expected. Comparing the relative number of boys and girls in different age groups – for instance, those aged 0–4 and those aged 5–9 (or excluding infants) – is a simple tool that can be used to make sure that the observed patterns were not driven by female under-registration. These exercises obviously assume that sex-specific migratory flows were not significant until children reached working age.

2.3. Sex-specific mortality rates around birth and during infancy and childhood

If our sources were perfect, the results of an analysis of the relative number of surviving boys and girls would mirror the picture obtained using sex-specific mortality rates. Therefore, analysing death statistics provides a direct way of looking into these issues. Given that these sources tend to provide the age of death, they also allow identifying whether discriminatory practices were happening right after birth, during infancy, or in early childhood (neonatal, infant, and early-childhood mortality). However, using these sources presents its own challenges. First, death registers did not always provide the same level of coverage as population censuses, especially for infants and young children, as a high proportion of infant deaths went unreported, especially if the infants died in the first 24 hours of life, an issue that again could especially affect girls (Henry, 1967; see also Llopis et al., 2022). It should be stressed nonetheless that female under-registration now makes it more difficult to observe discriminatory practices resulting in female excess mortality, so this qualification should be taken into account when interpreting sex-specific mortality rates. Given that the biases arising from potential female under-registration act in the opposite direction in population censuses and death statistics, both child sex ratios and the ratio between male and female mortality rates can complement each other. This analysis would ensure that registration problems are not a concern.

Again, the fact that males are biologically weaker than females complicates efforts to detect gender-discriminatory practices since more boys than girls were dying for natural reasons. Finding an appropriate benchmark for comparison is not straightforward, since it requires us to estimate what the gender mortality gap would have looked like at different ages in the absence of discrimination. In this regard, although the biological female advantage is especially visible during infancy, it also shapes mortality rates during early childhood. However, gender-discriminatory practices would tend to make the gender mortality gap smaller than would otherwise be expected because parents prioritised boys and/or neglected girls. It appears that this occurred in some regions in 19th-century Spain and Italy, and especially so among children aged 1–4 (Beltrán Tapia & Capelli, 2022; Marco-Gracia & Beltrán Tapia, 2021).

Furthermore, it is probable that the benchmark for comparison (the gender mortality gap in absence of gender discrimination) has not only evolved over time, but varied across regions depending on environmental circumstances. In this regard, climate and other environmental factors may have shaped sex-specific mortality rates, regardless of the presence (or absence) of a behavioural gender bias. For example, a particular disease environment may have harmed girls more than boys, and could therefore explain the female excess mortality observed in some areas. Anderson and Ray (2010), for instance, argue that infectious, parasitic, and respiratory diseases account for a significant fraction of excess female mortality during childhood in India, China, and Sub-Saharan Africa. Moreover, pulmonary tuberculosis seems to have taken a greater toll on females aged 5–25, especially up to the early 20th century (Hinde, 2015; Goldin & Lleras-Muney, 2019). By potentially affecting the relative number of surviving boys and girls, these factors also apply to the previous discussion on sex ratios. There is indeed a burgeoning literature that seeks to explain the wide variation in sex ratios at birth. This field of research often relies on environmental factors to explain the excess (or the lack) of male babies. It has, for

example, been posited that warm temperatures are related to higher sex ratios in Scandinavian countries (Catalano et al., 2008; Helle et al., 2009).

More efforts are therefore needed to account for how diverse environmental conditions may impact boys and girls differently, and thus affect the appropriate benchmark for comparison. We should, however, bear in mind that it is sometimes very difficult to disentangle environmental from behavioural factors. Populations in rural areas, for instance, tended to enjoy a healthier disease environment because they had better access to animal calories and a lower incidence of respiratory and digestive diseases (in contrast to the so-called 'urban penalty').¹⁶ Consequently, in rural areas, infant mortality rates tended to be lower, which 'naturally' resulted in fewer boys dying. However, son preference also tended to be stronger in rural contexts, which may have fostered discriminatory practices and resulted in either fewer boys or more girls dying.

2.4. *Child abandonment*

Foundling homes all over Europe kept extremely detailed records of the children who were admitted to these institutions. Studying the fate of these abandoned children is not only important in itself, but also because, given that many of these foundlings did not survive,¹⁷ the decision to abandon a child has often been equated to that of committing infanticide. The sheer number of abandoned children, which increased significantly during the first half of the 19th century, indicates the quantitative importance of this phenomenon (Fuchs, 1984; Fuchs, 2005; Kertzer, 1993; Ransel, 1988). Therefore, the availability of foundling homes in nearby regions probably made infanticide unnecessary. In this regard, while the sex of a new-born was probably irrelevant for an unwed mother (whose decision to abandon her child was mainly driven by shame), a married couple had more incentives to abandon their female baby if they lived in an area where son preference was strong. Detailed studies have indeed shown that more girls than boys were abandoned by legitimate families in Russia and Italy, a pattern that was especially visible during the early 19th century (Corsini, 1991; Hunecke, 1991; Kertzer, 1993). Similarly, girls were also abandoned in greater numbers in Greece, at least until the 1920s (Gallant, 1991; Loukos, 1994). Even the Athens Foundling Hospital, which was located in the capital and therefore probably less affected by son preference than rural areas, had a marked surplus of female foundlings until well into the 1930s (Kalaitzidou, 2022). By contrast, there is less evidence that parents in other European regions considered the sex of their children when deciding whether to abandon them (Lynch, 2011, p. 255).¹⁸

However, as abandoning children was not always possible or desirable, we should not take for granted that families were not resorting to more drastic means of getting rid of unwanted babies. On the one hand, many of these institutions actively prevented the abandonment of legitimate children (Kertzer, 1993, p. 71), with varying degrees of success. It has been argued that the relative number of girls being abandoned closely mirrored the extent to which married couples could abandon their children. On the other hand, as abandoning a child could put the family honour at risk (Derosas, 2012, 98), infanticide may have been seen as a better option, especially given that it was relatively easy to conceal it as a natural death. Finally, foundling hospitals were not always located nearby, so exposing a child in the streets (or in a more isolated area) could actually be

considered a surrogate form of neglect. It has indeed been estimated that the number of abandoned children who never reached a foundling home alive was probably much higher than the number of children who made it to those institutions (Pérez Moreda, 2005).

2.5. Qualitative materials

In the conference on ‘Sex ratios and missing girls in history’ that took place in Trondheim in 2022, Katherine Lynch encouraged researchers to complement their quantitative approaches with qualitative sources. After all, it is often argued that the scarcity of anecdotal evidence on these kinds of discriminatory practices challenges the mere existence of ‘missing girls’ in historical Europe (Viazzo, 2001, p. 179; Lynch, 2011, p. 254). Qualitative sources indeed allow researchers to put ‘flesh’ onto the ‘skeleton’ unearthed using numerical patterns, and to shed light on the perceptions and motivations behind these practices. However, using these sources also presents serious drawbacks, as they tend to reflect the biased perceptions of the observers, who were often educated interlocutors or members of the upper classes. Even if the rural masses had been literate, the intimate or illegal nature of some of these practices may have still prevented these historical actors from writing about them. Likewise, it is also plausible that the social norms that guided these practices were so ingrained that families did not even reflect on them. It should be noted that the lack of qualitative evidence also affects the issue of female under-registration. Contemporaries and scholars today often assume that skewed sex ratios at birth were the result of the failure to register female babies, but there are hardly any direct accounts of why families (or the enumerators) may have preferred not to register their female babies.

In any case, a wide range of qualitative sources, ranging from contemporary accounts, literary works, folklore traditions, newspapers, and anthropological studies, indeed confirm that girls had an inferior status that put them at risk. Analysing evidence from mid-19th-century France, Weber (1986, p. 172) found that while the birth of a male baby was greeted with joy, the birth of a female baby was received with disappointment, and was often considered a calamity. Such accounts are quite common, and have been documented in other places, such as Greece, Italy, and Russia (Beltrán Tapia & Raftakis, 2022, p. 331; Beltrán Tapia & Capelli, 2022, p. 2; Malein & Beltrán Tapia, 2022).¹⁹ This kind of material is sometimes visible as recently as in the 1930s in Italy and in the Polish Republic (Mancini, 2020; Ogórek & Szołtysek, 2022, this issue). There is also scattered anecdotal evidence from different countries suggesting that parents often privileged boys over girls not only in terms of investments in education, but also in terms of the allocation of food, clothes, and/or care (Borderías et al., 2010; Erlich, 1966; Kennedy, 1975; Papathanassiou, 2004; Thomas & Znaniecki, 1918; Vernier, 1984).²⁰ Unfortunately, qualitative evidence tends to be anecdotal and fragmentary, so researchers should be cautious when extrapolating such evidence to the behaviour of wider populations.

As was mentioned above, and contrary to the crude figures obtained from population censuses and vital statistics, these accounts provide crucial hints about the factors that fostered these practices. For example, the Greek sources identified the dowry system as the most important factor contributing to the preference for sons (Beltrán Tapia & Raftakis, 2022). As well as pointing out to the role of the dowry, Weber (1986, p. 172)

explains that, in 19th-century France, son preference was rooted not only in the need for male farm labour, but also in the lack of labour opportunities for females, which meant that girls were less able than boys to bring monetary income into the household.

Moreover, although these sources did not always explicitly refer to discriminatory practices for the reasons outlined above, they shed further light on how these societies functioned, and therefore complement other accounts. The subordinated position of women is clearly visible in qualitative accounts in many European societies, some of which indicated that wife beating was pervasive in many regions, and was even seen as justified (Hufton, 1998, p. 296). Weber (1986, p. 171), for instance, reported that 'wives were beasts of burden seldom set to rest', and equated marriage with female slavery. Likewise, these sources also reflect attitudes on childrearing practices. Children were numerous, and losing some of them was not considered as especially dramatic, and was sometimes even viewed as a blessing (e.g., Corsini & Viazzo, 1997; Janssens & Pelzer, 2014; Weber, 1986, pp. 170–177). For instance, the rare memoirs of a woman born in a poor rural household in late 19th-century Spain clearly stated that children were not always welcome, especially in already large families in which additional births placed a heavy burden on the limited household resources, and especially on the mother's energies (Domínguez, 2021, p. 125).²¹ In line with the other evidence presented here, the Greek qualitative accounts provide the bleakest picture of the subordinated position and harsh conditions that Greek women suffered at least until the early 20th century (Beltrán Tapia & Raftakis, 2022). However, we have the interesting conundrum of having identified dramatic accounts of the allegedly alarming low status of women in certain regions of Europe, like in the Polish Second Republic, that did not translate into visible patterns of gender-discriminatory practices during infancy and childhood (Ogórek & Szoltysek, 2022, this issue). The Polish interwar case sheds light on the ways in which female infanticide and the mortal neglect of girls (or lack thereof) may have interacted socially and symbolically with other forms of gender power, and with differences between the private and the public spheres.²²

2.6. Other sources

The sources examined above do not exhaust the options open to researchers examining these issues. For instance, archaeological evidence from burial sites has been used to document unbalanced ratios of males and females, thus suggesting that female infant and youth mortality rates were unusually high in Italy between the 6th and the 15th century (Barbiera, 2008; Barbiera et al., 2017).²³ Similarly, Maravall and Baten (2019) use the relative frequency of linear enamel hypoplasia, a permanent defect found on teeth, to proxy for malnutrition and disease during early childhood and assess whether boys and girls received the same food and/or care. Although the scarcity of the data and the ample room for different interpretations makes drawing any inferences from such findings hazardous, they are highly suggestive, and shed light on periods that are very difficult to study using other sources.

Court records, on the other hand, provide direct testimony on infanticide, and can thus be seen as more reliable sources of information on these practices. However, these records probably conceal more than they reveal, since the number of prosecuted cases probably represents only a very small fraction of the actual phenomenon (Hufton, 1974,

p. 350, 1998, pp. 274–275; Ulbricht, 1990; Van Dülmen, 1991; Leboutte, 1991; Gowing, 1997; Francus, 1997), especially in relation to the behaviour of married couples. Given the high rates of neonatal mortality, married couples could easily conceal infanticides as natural deaths; hence, the vast majority of infanticides never came to the attention of the authorities. Therefore, court cases largely reflect the situations of single mothers, whose behaviour was more likely to be driven by shame rather than by the sex of the baby.

Likewise, children's heights and other bodily measures could shed light on discriminatory practices that did not necessarily end up affecting their survival chances, at least in the short term. Height, in particular, offers a cumulative measure of net nutrition over the growing years (see Floud et al. 2009). However, due to the nature of the main historical sources, which measure military conscripts and prisoners, the literature has mostly focused on adult heights. As this indicator can conflate what happened to an individual at very different life stages, it is difficult to identify whether deviations from the expected height are due to differential treatment at a particular stage, or the result of other unobserved factors that contributed to net nutrition.²⁴ Furthermore, most of the information on height pertains to males, and there are far fewer sources comparing men and women.²⁵ However, using data on children opens up a research avenue that has seldom been explored in the historical literature. Relying on the height-for-age score (HAZ) for more than 16,000 children working in textile factories in mid-19th-century Northern Britain, Horrell and Oxley (2016) find evidence that girls aged 11–12 were significantly more deprived than boys; a disadvantage that was not visible in younger children, and therefore suggests that the 'double burden' of working both at home and at the factory penalised girls. Similarly, recent research explores how children are affected by the number of children in the family in order to assess the role of resource dilution on health (see Öberg, 2017). In addition, Schneider (2022) have built a worldwide dataset on child stunting since the 19th century. Although the different samples in the dataset are not always representative and may suffer from other issues (small sample size, etc.), this and future datasets should make it easier to assess whether the health of boys and girls hid the effect of discriminatory practices. This also applies to other types of anthropometric data, such as data on weight (and Body Mass Index).²⁶

In addition, historical social surveys and family monographs often provide information on household incomes and expenditures, and therefore allow us to directly study the allocation of resources within the household (A'Hearn et al., 2016; Saaritsa, 2016; see also Borderías & López, 2003). Moreover, rather than reflecting the outcomes of discriminatory practices (as heights or survival rates do), household budgets shed light on the nature of the practices themselves, and therefore complement the more qualitative material described above. However, these sources tend to reflect the situations of particular segments of the population, and are therefore not always fully representative of the population under study. There are, in any case, very few studies that have used these sources, probably due to the difficulties involved in finding such materials. It should also be noted that these sources mostly cover later periods, when these practices might have already disappeared. Studying urban Finland during the 1920s, Saaritsa and Kaihovaara (2016), found that there was a pro-girl bias in schooling expenditures among low-income households, which was probably explained by the higher opportunity cost of schooling that boys faced, as they could earn wages from an early age, and could thus contribute to

the family income. Following up on those results, Saaritsa (2017) links variation in household health expenditures to morbidity by age and sex and finds that, in Finnish families, money followed sickness rather than gender. Similarly, in a study of more than 100 household budgets from rural Italy in the 1930s, Mancini (2020) failed to identify a clear bias against girls, despite finding evidence of a rigid gender-based division of labour. Nonetheless, the increasing efforts by researchers to collect these kinds of sources – which have been fostered by the *Historical Household Budget Project* – offer new opportunities for studying gender inequalities in the past.²⁷

2.7. Random noise

Before finishing this section, we should stress that the accuracy of the inferences obtained from any of the sources outlined above also depends on the sample size underlying each observation. The sex of a baby is a random process that follows a binomial distribution, which can result in high (or low) sex ratios in small samples simply by chance (Wilson & Hardy, 2002). While this is usually not an issue when analysing large populations (i.e., countries or large regions), random noise can introduce significant biases when studying smaller levels of aggregation (see Beltrán Tapia, 2019; Szoltysek et al., 2022a). Extreme sex ratios (either too high or too low) can therefore arise merely by chance, regardless of whether they are obtained from vital statistics, population counts, or admissions to foundling hospitals. This problem is visible in cross-sectional data, but also when assessing the evolution of sex ratios over time or across age groups. Thus, dramatic fluctuations in sex ratios can simply reflect the role of the randomness associated with small numbers.

Assessing the degree of uncertainty is relatively straightforward when dealing with quantitative evidence. Using micro-data from the NAPP and Mosaic Project, Szoltysek et al. (2022a) explicitly model the random noise arising from the size of the different locations, and compute the confidence intervals. Using these measures, rather than point estimates, should be standard practice to ensure that the reader is informed about how likely a particular outcome is.²⁸ Similarly, recent studies have also considered the variation in the sample size underlying each observation when seeking to correlate child sex ratios to local factors (Beltrán Tapia & Gallego-Martínez, 2020; Szoltysek et al., 2022b), a procedure that is also applied in two of the articles in this volume (Malein & Beltrán Tapia, 2022; Ogórek & Szoltysek, 2022, this issue). Indeed, these issues should be routinely considered when using individual-level information, since logistic regression models, as well as survival and hazard models, take into account the underlying uncertainty when estimating the probability that a boy (or a girl) dies or survives. Although historians using qualitative sources seldom explicitly account for the sample size they rely on, this issue should also be discussed (in addition to the implicit biases contained in the source, as mentioned above).

3. What factors contributed to the gender discrimination in infancy and childhood in historical Europe?

The evidence provided so far suggests that gender-discriminatory practices inflated female mortality rates early in life in some regions in Southern and Eastern Europe (Beltrán Tapia, 2019). Highly unbalanced child sex ratios have also been found in the

Balkans (especially in Albania), in parts of the Russian Empire, and in some scattered locations in Southern France, the central German territories, and Poland (Szołtysek et al., 2022a, p. 111; Malein & Beltrán Tapia, 2022). This evidence, derived from indirect methods, is mostly based on the information contained in population counts. Detailed case studies further support the claim that a significant fraction of girls indeed went ‘missing’ in Southern Europe. The most dramatic case is that of Greece, where a strong son preference resulted in more than five per cent of girls being ‘missing’ between 1861 and 1920 (Beltrán Tapia & Raftakis, 2022).²⁹ Both quantitative and qualitative evidence supports that Greek girls were neglected in different ways and such practices increased their mortality rates both right after birth and throughout infancy and childhood. Clear signs of discriminatory practices early in life has also been found in some regions in Spain and Italy (Beltrán Tapia & Capelli, 2022; Beltrán Tapia & Gallego-Martínez, 2017, 2020). Although still significant, the number of ‘missing girls’ in these countries was smaller than in Greece, and this phenomenon probably also receded earlier. However, as the national averages conceal a high degree of internal variation, this conclusion should be qualified depending on the region analysed (this appears to also be the case in Greece; see Gavalas & Baltas, 2022). While other regions may have been affected by this behaviour as well, the available evidence is thinner. Earlier research has indeed suggested that this kind of behaviour was probably present in other European countries, such as France, Ireland, Britain, and Belgium (Kennedy, 1975; Poulain & Tabutin, 1981; Eggerickx & Tabutin, 1994; Alter & Oris, 2000, p. 364; McNay et al., 2005). In their comprehensive essay, Tabutin and Willems (1998) show that the ratio of male-to-female mortality during infancy and childhood was particularly low in many of these areas. The cluster of high child sex ratios observed in some regions of France, Sweden, and Germany definitely deserves further attention (Beltrán Tapia, 2019, p. 9; Szołtysek et al., 2022a, p. 111). Similarly, and contrary to the conventional wisdom that ‘missing girls’ can hardly be detected in North-Western Europe, Perner et al. (2022) in this issue argue that child sex ratios might be too crude to capture discriminatory patterns in low-mortality environments. Indeed, their research suggests that the survival of Danish girls was probably compromised from early childhood onwards due to differential treatment (and despite an allegedly non-discriminatory family-demographic environment). It appears that similar patterns were also present in Norway in the 18th and early 19th centuries, especially among the landless population (Kovacevic, 2022).

Detailed local case studies are also able to identify the life stage when such discrimination was actually taking place. In this regard, the rich parish registers from a rural area in North-Eastern Spain clearly show that families were neglecting some of their female babies (Beltrán Tapia & Marco-Gracia, 2022a). However, unlike in Greece, where female infanticide and/or neglect right after birth was a widespread phenomenon, in Spain, the lack of anecdotal evidence on female infanticide, and the evidence that sex ratios at birth were not highly skewed, suggest that the ‘missing girls’ phenomenon in this region did not occur primarily right after birth. Gender-discriminatory practices shaping sex-specific mortality rates were more evident during infancy and early childhood (Marco-Gracia & Beltrán Tapia, 2021). However, these practices are less visible during the first year of life, because once infants were accepted into the family, breastfeeding protected boys and girls alike. Nonetheless, sex differences in mortality rates clearly resurfaced when children were weaned and started competing for scarce household resources. These patterns of

female neglect right after birth and during infancy and childhood in this particular region of Spain have been confirmed in an article in this volume focusing only on twins, which showed not only that the sex ratio at baptism was extremely high, but also that more males survived infancy and early childhood despite being biologically more vulnerable (Marco-Gracia & Beltrán Tapia, 2022). Therefore, discriminatory practices during childhood seem to have been part of a generalised cultural system that privileged boys in terms of access to food and/or care. It appears that these findings are concentrated at higher parities, and among landless and semi-landless families who were subject to harsher economic conditions. Similar patterns are found in France, Belgium, and Italy, where the mortality of girls exceeded that of boys especially during early childhood (Tabutin, 1978; Eggerickx & Tabutin, 1994; Pinnelli & Mancini, 1997; Tabutin & Willems, 1998; Alter & Oris, 2000; Oris et al., 2004; Derosas, 2012; Beltrán Tapia & Capelli, 2022).

The prevalence of the ‘missing girls’ phenomenon varied within historical Europe, and declined from the late 19th and the early 20th century onwards. The timing of the process also differed across regions, which suggests that different local factors were behind it. Discriminatory practices could have persisted even longer in some regions (i.e., in the Balkans), or re-emerged under certain circumstances (i.e., in the Caucasus). Regardless of when they occurred, these developments reflected the different attitudes towards boys and girls, which were linked to economic, social, and cultural dimensions that shaped the role of women in society, and the perceived relative value of girls. Both comparative and detailed regional analyses provide some clues about the dimensions involved, which indeed mirror some of the patriarchal features that have been associated with son preference and female neglect in South and East Asia today (Das Gupta et al., 2003; Guilmoto, 2015; Jayachandran, 2015; Bhalotra et al., 2020). Although there has been less research on the factors that contributed to these practices in historical Europe, in the following paragraphs we outline the main drivers discussed in the recent literature.

3.1. Poverty

Discriminatory practices only affected survival chances in societies that lived close to subsistence levels. The mortal neglect of girls indeed tended to show up most clearly in societies where families had to make hard choices in terms of allocating the scarce resources they had available. As was mentioned above, it seems that the likelihood of girls going ‘missing’ increased at higher parities and among landless and semi-landless families who were subject to harsher economic conditions (Beltrán Tapia & Marco-Gracia, 2022a; Derosas, 2012; Marco-Gracia & Beltrán Tapia, 2021). Likewise, in areas where son preference was stronger, negative economic shocks, such as subsistence crises, were likely to trigger or accentuate discriminatory practices. Malein and Beltrán Tapia (2021) show that the famine that devastated the Volga region in 1891/92 led to an increase in child sex ratios, even though the harsh conditions should have especially penalised males. Moreover, in a study on the effects of high-price years on different demographic outcomes in a sample of villages in North-Eastern Spain between 1800 and 1910, Beltrán Tapia and Marco-Gracia (2022b) find that rural families prioritised males when faced with difficult circumstances. Living standards in Southern and Eastern Europe were extremely low before 1900, and it is no coincidence that the unexplained female mortality that can be observed using population censuses and vital statistics disappeared as soon as these

regions started achieving higher levels of economic development from the early 20th century onwards (Beltrán Tapia & Capelli, 2022; Beltrán Tapia & Gallego-Martínez, 2017; Beltrán Tapia & Raftakis, 2022). Interestingly, neonatal discrimination against girls in Spain resurfaced again during the early 1940s due to the extremely difficult economic conditions brought about by the Spanish Civil War and the subsequent autarchic period (Echavarri, 2022).

Notwithstanding the previous discussion, the changes associated with the structural transformations that Europe was undergoing during the 19th and the early 20th century were not always conducive to a reduction in discriminatory practices against girls. Commonly used proxies for economic development, such as the importance of manufacturing or literacy levels, were often not associated with the geographical variation in child sex ratios in particular countries (Beltrán Tapia & Gallego-Martínez, 2020; Malein & Beltrán Tapia, 2022; Ogórek & Szołtysek, 2022, this issue). We should bear in mind that economic modernisation sometimes overlapped with the demographic transition. Like in South and East Asia today, the reduction in fertility levels that the demographic transition entailed may have accentuated the pressure to secure at least one male descendant. Similarly, Echavarri and Beltrán Tapia (2022, p. 18) argue that not only cities grew thanks to the inflow of rural migrants who were bringing their cultural values with them (including son preference), but also that the disruptions caused by industrialisation may have accentuated the pressures on the limited budgets of the most precarious segments of the population. Indeed, their work suggests that gender discrimination around the time of birth did not necessarily vanish as a result of economic growth unless this process was accompanied by expanding labour opportunities for women.

3.2. Female labour opportunities

The subordinated position that women held in pre-industrial Europe is partly explained by the importance attached to male labour in agricultural and pastoral contexts (Alesina et al., 2013; Becker, 2019; Giuliano, 2017). Sharecropping families in 19th-century Tuscany, for instance, favoured large families in order to secure male labour and a male heir (Manfredini et al., 2016, 2017; also in Kertzer, 1993, p. 111). Among other factors, son preference in 19th-century France reflected both the need for male farm labour and the lack of female labour opportunities in other sectors, which made it difficult for women to bring monetary income into the household (Weber, 1986, p. 172).

Except for those involved in proto-industrial manufacturing, rural areas tended to offer fewer employment opportunities to women (Medick, 1976). Parents not only faced more difficulties finding jobs for their daughters, but girls were paid less than boys, so their contributions to the family income were smaller. The available empirical evidence shows that in these regions, the proportion of male children was larger (Beltrán Tapia, 2019; Beltrán Tapia & Gallego-Martínez, 2020; Szołtysek et al., 2022a). Focusing on Poland in a relatively late period (the early 1930s), Ogórek and Szołtysek (2022, this issue) also find that child sex ratios were lower in those areas where women had more employment opportunities outside of (but not in addition to) farming. We should, however, bear in mind that rural areas enjoyed lower mortality environments, which tended to especially benefit children, as discussed above. It is, therefore, difficult to disentangle whether the better prospects sons enjoyed in the countryside were due to natural factors or to gender-

discriminatory practices. Research on Italy and Spain nonetheless supports the argument that as female labour opportunities increased, women's bargaining power and their health outcomes improved (Beneito & García-Gómez, 2021; Pinnelli & Mancini, 1997).

3.3. *Complex family structures and patrilineal kinship*

Complex family households, which were once present in many areas of Europe (Szołtysek, 2015), have long been tacitly considered clear evidence of gender-inequitable family and social practices in the regions where these households are located (Verdon, 1998; Szołtysek & Gruber, 2014; also Laslett, 1988; Mitterauer, 1981). As is discussed in more detail later in this Special Issue (Szołtysek et al., 2022b), large and complex (often called 'joint') households may indeed have been the carriers of some structural features critical for gender differentials in mortality, such as the tendency to prioritise male labour, place a higher economic value on men, practice a male-centred type of intergenerational solidarity, and enforce rigid gender roles. These features limited female autonomy and, ultimately, fostered a strong son preference and a gender-unequal allocation of resources and care within the family (Alter et al., 2004; Skinner, 1997; cf. Guilmoto, 2009; Lee et al., 2004, pp.437–38; Manfredini et al., 2016; Mancini, 2020). Complex families in central Italy and similar family configurations found in the Balkans and Greece actually appear to have been detrimental to girls' survival chances during the first years of life, and, more generally, to female autonomy and health (Beltrán Tapia & Raftakis, 2022; Kaser, 2000; Manfredini et al., 2017).

However, focusing on household structure offers only a starting point for exploring how and why multigenerational living arrangements affected female survival chances in infancy and early childhood. As illustrated in Szołtysek et al. (2022b, this volume), while the prevalence of complex domestic groups was indeed associated with higher child sex ratios, areas dominated by less complex co-residence patterns had child sex ratios ranging from extremely low to abnormally high,³⁰ which suggests that other factors might have been equally important in fostering gender-discriminatory practices early in life.³¹ This point has been well taken in the research on South and East Asia that shows that it was not household structure *per se*, but rather the interlocking occurrence of patrilineal inheritance, patrilocal residence, as well as culturally embedded age- and sex-graded intra-household hierarchies, that seems to have been decisive in the deterioration of the relative status of female offspring, and was the ultimate reason why investment in girls came to be perceived as 'watering your neighbour's garden' (Attane & Guilmoto, 2007; also Arokiasamy & Goli, 2012; Singh et al., 2021). According to these authors, son preference was stronger in societies where sons were expected to support their parents, while daughters left the parental household after marriage and joined their husband's household. This argument is supported by qualitative evidence gathered from Italian rural areas during the 1930s where girls were not welcome because they consumed household resources, but their labour was employed somewhere else when they married (Mancini, 2020). A large sample of European historical locations shows that patrilocality was indeed strongly related to excess female mortality early in life (Szołtysek et al., 2022b). The Polish case included in this special issue (Ogórek & Szołtysek, 2022) further strengthens this point, even though it deals with a relatively late period (the early 1930s). As the authors stressed, while the *percentage of multifamily households* variable was not found to have

any significant effect on child sex ratios across districts, a more intuitive measure of anti-patriarchal features of household organisation yielded a significant and negative relationship with the relative survival of boys and girls. This observation illustrates that female status and the presence of gender-discriminatory practices were less affected by the mere intergenerational coresidence than by particular constellations of power and authority within domestic groups (or composites of various household-related attributes; Ogórek & Szołtysek, 2022, p.17, this issue).

An important implication of these and related insights is that more care is needed when projecting the supposedly more 'female-friendly' environment of today onto the family systems of historical North-Western Europe (*aka* the European Marriage Pattern), and when acknowledging the allegedly foundational role of (neo-local) nuclear household structures in more gender-balanced practices within the family (see Dennison & Ogilvie, 2014, pp. 4,62–65; cf. 66; De Moor & Van Zanden, 2010; Lynch, 2011; Van Zanden et al., 2017). Crucially, Szołtysek et al. (2022b) show in this Special Issue that the prevalence of neolocality was positively related to child sex ratios in the large set of cross-sectional census microdata they have collected, which raises additional doubts about the relationship between the nuclearity/neolocality complex and gender-equal practices. As these authors argue, the very concept of neolocality can refer to very different familial dynamics and life course and residential choices among individuals, and these factors could have a very mixed influence on the autonomy and agency of females, including on their survival chances. Evidence from 19th- and early 20th-century Spain lends further support to this argument, as areas where nuclear households dominated also had higher sex ratios, both at birth and during childhood (Beltrán Tapia & Gallego-Martínez, 2020; Echavarri & Beltrán Tapia, 2022). However, the observational nature of most of these studies makes it difficult to separate the role of these familial configurations from that of other unobserved factors.³² Thus, more efforts are needed to better clarify which familial constellations were more prone to relegate women to subordinate positions, and how domestic group patterns interacted with other social structures in determining the power balance between the sexes.

3.4. The marriage market, female age at marriage, and the dowry system

Although it is difficult to separate particular features from the wider familial system, it is useful to isolate some of the characteristics that form the marriage system. In societies where strong social norms push women to get married as early as possible, their bargaining power is reduced, as they do not have the option of remaining single. It has indeed been argued that a low female age at marriage and a wide spousal age gap were detrimental to women's position within the household, which, in turn, negatively affected the health and the economic welfare of women and female children (Gruber & Szołtysek, 2016; Kok et al., 2017, pp. 36–37). Both dimensions were found to be linked to higher child sex ratios in the empirical exercise performed by Szołtysek et al. (2022b) in this volume, which further supports the relevance of these features in shaping women's bargaining power, and in how parents treated their sons and daughters. The custom of arranging marriages would exacerbate this problem, since this practice left less space for the spouses' preferences, and therefore reinforced the existing inequalities.

In addition, evidence that the dowry system made girls an additional burden to their family has been found for many regions in historical Europe, especially in Greek and Italian sources (Beltrán Tapia & Raftakis, 2022, pp. 331–332; Kertzer, 1991, p. 9, 1993, p. 111). By draining off the family property, the dowry system also penalised girls in some French regions, at least during the 19th century (Weber, 1986, p. 172). In contrast, the practice of bride price, which is common in some areas of the Russian Empire, created different incentives for the parents, and thus probably altered the household gender dynamics. Likewise, the lack of marriable men also led to adverse marriage prospects for girls, and caused their position within the household to decline (Erich, 1966). The shortage of potential male partners due to the mass migration that occurred in Greece during the late 19th and early 20th centuries further worsened the position of women in the marriage market. As parents had to compete to marry all their daughters to the few men available, they had to increase the value of the dowries.

3.5. Religion and other cultural factors

Although religious practices appear to play an important role in son preference in South and East Asia,³³ the existing evidence for historical Europe suggests that religion had little influence on the intensity of discriminatory practices against girls. Except for part of the Albanian population and some groups in the Russian Empire, most of the populations discussed above were Christian. Thus, it seems that other factors were behind the lower status of females and the son preference existing in Europe. Note also that Christianity (as well as Islam) explicitly forbade infanticide. There is, however, ample evidence that this practice (as well as child abandonment) existed to some extent all over Europe (Hanlon, 2016; Hanlon, 2022). This raises the question of why Christian teachings against infanticide (Stark, 1996, ch. 5; Lynch, 2011) were not as strictly obeyed in some areas. It should be nonetheless stressed that although the cleavage between Catholicism and Protestantism (and its different denominations) might have influenced some of the different patterns observed within Europe, to our knowledge, no existing study has explicitly addressed this issue.³⁴

The hypothesis that religious denomination was not a major factor in the intensity of female excess mortality early in life is also reinforced when we look at the rich tapestry of religious and ethnic groups composing the Russian Empire. Relying on the 1897 Imperial Census, Malein and Beltrán Tapia (2022) show that while religion did not help to explain the variation in child sex ratios across districts in European Russia, the presence of different ethnic groups did shape those figures, even after controlling for religion and other dimensions. The groups defined as Polish, Belarussian, Baltic, Greek, Armenian, Turkish, and Kalmik had a clear excess of male children, which was probably related to the presence of strong patriarchal norms. Although these results appear to reflect the differences in the familial and/or kinship systems of these ethnic groups, other cultural explanations, such as the possibility that lineage was traced solely through males, may also be relevant. It is very telling that those regions within the Russian Empire that had inflated child sex ratios in the late 19th century also have more discriminatory gender norms today, which suggests that those cultural traits have been transmitted across generations.

3.6. Violence and conflict

It has been argued that son preference is stronger in conflict-ridden areas because the fear of conflict affects the relative value of boys and girls (Sng & Zhong, 2018; Mavisakalyan & Minasyan, 2022; Golli et al., 2022; see also Das Gupta, 2022 in this volume). In such contexts, males are generally seen as useful defenders, while females are considered liabilities because they need to be protected. Given that many conflicts accompanied the birth of modern Greece, this situation probably also contributed to the lower status of females in that country (Beltrán Tapia & Raftakis, 2022, p. 332). The perception that women needed to be protected was aggravated by the concept of honour that was characteristic of Greek and other Mediterranean cultures (Peristiany, 1965). As a woman's moral reputation was extremely important for the family honour, women were closely monitored. Attacks on the family honour often resulted in blood feuds and a culture of violence that further reinforced the prominent position of sons. This pattern can be plausibly extended to the Balkans, and perhaps to other areas in Southern and Eastern Europe where conflict and violence were endemic.³⁵ Although this hypothesis needs to be formally tested, the available evidence is highly suggestive.

The Greek case brings together many of the characteristics outlined above. Thus, it is hardly surprising that the 'missing girls' phenomenon was especially dramatic there, since female neglect was linked to girls having an inferior status. The Balkans, Belarus, and some Russian regions in the Urals and the Caucasus also shared some of these features, and are therefore strong candidates to have exhibited gender-discriminatory practices early in life (Szołtysek et al., 2017). Other regions, such as Italy or Spain, conformed only partially to some of these features, which may explain why their discriminatory patterns were not as extreme as those in Greece (Beltrán Tapia & Capelli, 2022; Beltrán Tapia & Gallego-Martínez, 2020; Marco-Gracia & Beltrán Tapia, 2022). Although the evidence provided by Malein and Beltrán Tapia (2022) in this issue does not identify particular dimensions, it also shows that cultural factors linked to particular ethnic groups fostered these practices in Imperial Russia. The intensity of patriarchal values can indeed go a long way towards explaining regional and temporal differences in levels of gender discrimination early in life. As shown by Szołtysek et al. (2022b) in this volume, information on more than 300 populations in historical Europe taken from the NAPP/Mosaic project indicates that the Patriarchy Index (PI), which measures the intensity of sex- and age-related social inequalities, was positively associated with child sex ratios, and that this link that was especially strong in rural areas. Disaggregating the PI into its different components is also illuminating because it shows that child sex ratios tended to be higher in locations with patrilocal norms and a low female age at marriage. Nevertheless, the econometric models employed by these recent attempts to explore the determinants of child sex ratios in historical Europe explain only part of the variation in the dependent variable (Beltrán Tapia & Gallego-Martínez, 2020; Malein & Beltrán Tapia, 2022; Ogórek & Szołtysek, 2022; Szołtysek et al., 2022b, 2022a). Although random noise may explain some of the remaining variation, the finding that the residuals of these models still exhibit spatial patterns suggests that other factors that are not accounted for by their specifications also played a role. Likewise, this wave of studies does not pretend to causally identify the relationships

at play, so their results may suffer from the omitted variable bias, despite controlling for a wide range of economic, demographic, social, and environmental features.

4. Concluding remarks

Discriminatory practices with lethal consequences for girls appear to have constituted a hidden feature of pre-industrial Europe, which resulted in a significant number of 'missing girls', that is, girls who died due to neglect right after birth and/or due to differential treatment during infancy and childhood. Building on earlier research, this new narrative provides evidence that parents treated sons and daughters differently, especially in Southern and Eastern Europe (Beltrán Tapia, 2019; Beltrán Tapia & Gallego-Martínez, 2017; Szoltysek et al., 2022a). Quantitative and qualitative material paint an especially bleak picture for Greek girls, at least until the 1920s (Beltrán Tapia & Raftakis, 2022). More attenuated forms of female excess mortality early in life have been found in some Spanish and Italian regions (Pinnelli & Mancini, 1997; Derosas, 2012; Manfredini et al., 2016; 2017; Beltrán Tapia & Marco-Gracia, 2022a; Marco-Gracia & Beltrán Tapia, 2022; Beltrán Tapia & Capelli, 2022). The Mosaic Dataset suggests that Eastern Europe also hosted extremely patriarchal societies with highly unbalanced child sex ratios (Szoltysek et al., 2022b, 2022a). A similar pattern is also visible in some areas of the Russian empire in the late 19th century (Malein & Beltrán Tapia, 2022). Given the observed variation in child sex ratios and the ratio between male and female infant and child mortality rates in other European countries, it is possible that this behaviour was also present in other regions, especially among deprived segments of the population (Alter & Oris, 2000; Eggerickx & Tabutin, 1994; Kennedy, 1975; Perner et al., 2022; Poulain & Tabutin, 1981). However, with the exception of Greece and probably other scattered areas in the Balkans and in Eastern Europe, the 'missing girls' phenomenon appears to be quantitatively less important in historic Europe than it is in countries like China and India today. Given that South and East Asia also suffered from this phenomenon in the past (Bhaskar & Gupta, 2007; Dong & Kurosu, 2017; Drixler, 2012; Fenske et al., 2022; Gupta, 2014; Lee & Campbell, 1997; Mungello, 2008), direct comparisons between the historical experiences of Asia and Europe, as well as their evolution over time, would serve as a useful starting point for framing this discussion in the future.

The nature of these practices is less clear, and probably varied across regions. Given the lack of anecdotal evidence on female infanticide, it is likely that this behaviour was limited in scope, or was restricted to certain regions. By contrast, child abandonment was widespread, and girls were especially targeted in some regions (Gallant, 1991; Kertzer, 1993; Ransel, 1988), which certainly increased their mortality rates. In addition, a large share of the unexplained excess female mortality we observed probably arose from an unequal distribution of resources within the household. In high-mortality environments, discrimination in the ways girls were fed or treated when ill, or in the workloads girls were assigned, likely increased female mortality rates due to the combined effects of malnutrition and illness. Scattered anecdotal evidence supports the claim that families prioritised males, especially in periods of economic stress. Rather than indicating outright neglect, this mechanism suggests that less extreme but perhaps more pervasive discriminatory practices had deleterious effects on the health of young girls. This interpretation would therefore help to reconcile the apparent lack of evidence on female infanticide and other

extreme versions of mistreatment of young girls in historical Europe with the evidence reported here. This view is also compatible with the claim that, in patriarchal societies, women and girls were discriminated against in many dimensions.

What factors contributed to these discriminatory practices? The existing evidence suggests that in historic Europe, as in South and East Asia, son preference was linked to economic, social, and cultural dimensions that shaped the role of women in society, and thus influenced the perceived relative value of girls. The important roles assigned to males in agricultural and pastoral societies, together with the lack of labour opportunities for females, surely penalised girls. Likewise, patrilocal arrangements and an adverse marriage market, together with the dowry system and other social and cultural factors, further decreased the bargaining position of girls. These discriminatory patterns affecting female mortality early in life disappeared during the first decades of the 20th century, as the demographic transition and other economic, social, and cultural changes improved living standards, reduced general mortality rates, and undermined son preference due to the expanding labour opportunities for females brought about by urbanisation and industrialisation (Beneito & García-Gómez, 2021; Pinnelli & Mancini, 1997).

There are still many unanswered questions, and more research is needed. As discussed above, using historical sources presents many challenges that make studying this subject especially difficult. Likewise, many areas have not been studied thoroughly, so there is ample room to conduct country or regional case studies that not only assess the relative importance of this phenomenon (or the lack of thereof), but also the mechanisms that explain it. The same reasoning can be applied to the temporal perspective. Due to the availability of material, we know much more about the 19th century (especially after 1850) than about the previous periods. More research is also needed to better determine whether girls went 'missing' right after birth or during infancy and childhood. Drawing on micro-data is especially important because subtle forms of gender discrimination are difficult to detect, and probably occurred only among certain segments of the population. Given that these practices are less visible using aggregate information, focusing on certain socio-economic groups therefore provides an exciting research avenue. In particular, individual-level information allows identifying whether these practices were more prevalent in particular socio-economic groups and/or certain familial configurations. Micro-data is also especially suited to explore the role of birth order and the number and sex-composition of siblings.³⁶ Lastly, as explained at length in [section 2](#), expanding the range of sources is also key for understanding the mechanisms that drove this behaviour.

This new evidence suggesting that discriminatory practices unduly increased girls' mortality rates in historical Europe is not only important in itself, but it also contributes to the re-evaluation of other research areas. On the one hand, it sheds more light on sex differences in infant and childhood mortality and their evolution in the past (Waldron, 1998; Sawyer, 2012; Costa et al., 2017; see also Boucher et al., 2022). Relying mostly on data for the United States, Goldin and Lleras-Muney (2019) show that the female advantage in life expectancy started to grow in the late 19th and the early 20th century. The authors argued that this process was primarily linked to the reduction in infectious diseases as a major cause of death. However, the existence of discriminatory practices suggests that the female advantage was less visible in the 19th century because it was partly constrained by the impact of those practices. These findings also have important

implications for our understanding of the traditional demographic regime and the subsequent transition to lower fertility and mortality rates. As well as using different methods to reduce fertility either indirectly (delaying age at marriage or celibacy) or directly (spacing or stopping births), European families engaged in practices that increased the mortality of their unwanted children, and especially of girls in those areas where son preference was strong (Harris & Ross, 1987; Hanlon, 2016; Beltrán Tapia & Marco-Gracia, 2022a). The gradual fading of these practices (or at least of their lethal effects as living standards increased) helps explaining the expansion of the female biological advantage in the late 19th and the early 20th century, as well as the decline in mortality that took place during the demographic transition. The extent to which this explanation applies obviously varies depending on the earlier prevalence of gender discrimination, so it is especially relevant in Southern and Eastern Europe (Pinnelli & Mancini, 1997; Beneito & García-Gómez, 2021).

Beyond considering the obvious negative impact that these practices had on the girls who suffered from them, this research also opens up the possibility of assessing whether this behaviour imposed externalities on the wider society. Given the problems involved in measuring ingrained cultural values (especially from a historical perspective), the evidence reported here allows us to further explore the negative association between gender inequality and economic development in the past (Carmichael et al., 2016; Diebolt & Perrin, 2013, 2019; Dilli et al., 2015; Merouani & Perrin, 2022; Perrin, 2021). In particular, measuring the impact of discriminatory practices using sex ratios or the gender mortality gap provides a proxy that allows linking these practices with other outcomes that can also be measured both across regions and over time, and therefore contributes to understanding the different long-term developmental trajectories within Europe. Accordingly, the prevailing attitudes towards girls and their role in society could be associated to historical variations in women's education, fertility rates, and/or female participation in the labour market, among other dimensions.³⁷ Beltrán Tapia and Capelli (2022), for instance, hypothesise that child sex ratios may serve to link the role of gender inequalities to the divergence in economic development between Southern and Northern Italy.

The general picture that is emerging regarding the historical scope, intensity, and character of the 'missing girls' phenomenon also offers new opportunities for exploring gender norms in the past. As well as discussing their spatial variability, it provides a fertile terrain to explore the continuities and changes in gender discriminatory practices within Europe.³⁸ Likewise, it also allows researchers to connect historical patterns to current practices, and to investigate the roots of gender inequality. González and Rodríguez-Planas (2020), for instance, looked at how the incidence and the intensity of domestic violence within Europe is linked to gender norms, which are, in turn, also historically determined (Tur-Prats, 2019; see also Walby, 1994). Consequently, uncovering forgotten patterns of gender discrimination, understanding the causes underlying this behaviour, and assessing their effects on economic, demographic, and social outcomes is a critical endeavour that the research outlined here has only started to undertake (see also Szoltysek & Poniat, 2018).³⁹ Finally, although the historical investigation of the 'missing girls' phenomenon does not offer an instruction manual, it still has the capacity to become a fresh reservoir of policy-relevant insights. In particular, the issues discussed here may help to inform policy recommendations for improving family institutions in

societies historically lacking agency. This could be accomplished by directing the attention of development practitioners and NGO sectors to the need to overcome the institutional barriers (linked to inherited family and patriarchal structures) that so often prevent the successful implementation of social policies (see, e.g., Latifi, 2019; also Kağıtçıbaşı, 1996).

One of the ways in which science progresses is by questioning the historically established certitudes within a given discipline (Szołtysek, 2005). Before the recent revisionism spawned by the research discussed above, it was assumed that there were no ‘missing girls’ in the European past. We lived in a comfort zone of ‘grand narratives’ in which the allegedly progressive familial, demographic, and religious institutions of Europe had little, if any, room for gender-discriminatory practices similar to those that Amartya Sen raised an alarm about some 30 years ago. The recent wave of studies carried out within the framework of the ‘Missing girls in historical Europe’ project has indeed re-opened an issue that previously appeared closed. That door is now half open. Future research should strive to continue opening it and explore what is beyond.

Notes

1. On the exceptionally high status of women in early Christian subcultures and the Christian condemnation of female infanticide from early on, see Stark (1995).
2. Harris (2008), however, argues that the evidence supporting a systematic gender bias in mortality rates in 19th-century Britain is not strong enough.
3. Obviously, we are aware of the trap of the debunked evolutionary paradigm (Thornton, 2005) of assuming that the present demographic conditions of the ‘Museum of Europe’ (as the Balkans were often imagined to be, see Todorova, 1997) can be used as a proxy for the circumstances of an earlier historical period of wider European societies. It is worth noting, however, that some ethologists have argued that neonatal infanticide and the mortal neglect of young girls have been part of the repertoire of human behavioural responses to particular circumstances in all cultures (Blaffer Hrdy, 1999; Daly et al., 1988; Eibl-Eibesfeldt, 1989). Hanlon (2022), for example, claims that neo-natal infanticide was a permanent feature of family planning in early modern Europe, characterising it as one of the manifestations of birth control, or rather *death control*.
4. See, however, Drelichman and Agudo (2020) and Palma et al. (2022), who argue that gender structures, at least those reflected in the labour market, differed little between Southern and Northern Europe in the early modern period, and therefore cannot explain their developmental trajectories.
5. A large part of this research has taken place within the framework of the ‘Missing girls in historical Europe’ project funded by the Research Council of Norway. More details here: <https://sites.google.com/view/missing-girls-in-history/home>.
6. By ‘natural’, we refer to the sex ratio in the absence of human manipulation.
7. A large number of studies have indeed found that environmental stressors are linked to lower sex ratios at birth (Fukuda et al., 1998; Catalano et al., 2005; Helle et al., 2009; Bruckner et al., 2010; Schacht et al., 2019, among others). See also Morse and Luke (2021), who directly linked foetal loss and higher female sex ratios at birth. The number of male stillbirths tended to significantly exceed that of female stillbirths during the first decades of the 20th century, but this gap declined over time as improving maternal conditions also reduced the incidence of miscarriages (Rettaroli & Scalone, 2021; see also Ruiu et al., 2022). However, the mechanisms behind the higher vulnerability of male fetuses are still largely unknown (Dipietro & Voegtline, 2017).

8. For a detailed assessment of the quality of female registration in 19th-century French sources, see Van de Walle (1974).
9. On the biological female survival advantage, see Waldron (1998), Drevebstedt et al. (2008), Peacock et al. (2012); Peelen et al. (2017); Zarulli et al. (2018) or Goldin and Lleras-Muney (2019), among others.
10. The coverage varies by country: Austria (1869–2001), Belgium (1846–2001), Bulgaria (1880–2001), Czech (1921–1990), Denmark (1845–2001), East Germany (1946–1981), England & Wales (1841–2001), Finland (1751–2001), France (1740–2001), Germany (1871–2001), Greece (1870–2001), Hungary (1869–2001), Ireland (1841–2001), Italy (1861–2001), Netherlands (1840–2001), Norway (1801–2001), Poland (1921–2001), Portugal (1864–2001), Romania (1899–2001), Russia (1897–2001), Scotland (1841–2001), Spain (1787–2001), Sweden (1751–2001), Switzerland (1860–2001), and Yugoslavia (1890–1990).
11. While around 100 infants per 1000 live births did not survive their first birthday in Norway circa 1880, this figure reached around 150 in England and Wales, 210 in Italy and Spain, and even above 250 in Germany around the same date (Mitchell, 2013). On spatial inequalities in infant mortality in early 20th-century Europe, see Klüsener et al. (2014).
12. Data coverage pairing infant mortality rates and child sex ratios decreases as we go back in time, and it varies by country.
13. Relying on a sample of countries between 1983 and 1999, Klasen and Wink (2003) also found that lower life expectancy was related to lower sex ratios at birth. For more details, see Beltrán Tapia & Gallego-Martínez (2017).
14. Beltrán Tapia and Raftakis (2022, p. 336) report that the authorities carrying out the 1879 Greek Population Census were worried that the fear that the census would be used for conscription purposes would incentivise families to hide their sons. Van de Walle (1974, pp. 18, 44) refers to stories about male under-registration in censuses and birth records in early 19th century France, as the population had long viewed these endeavours with suspicion, seeing them as tools used by the state apparatus to levy taxes or compile conscription lists.
15. Even if families were reporting all their family members, the local authorities could report a lower figure if that led to a reduction in the levied tax (e.g., Šiaučiūnaitė-Verbickienė, 2015).
16. On the urban penalty, see Reher (2001) and Dyson (2011).
17. It should be stressed that foundling hospitals not only had extremely high mortality rates, sometimes reaching 90% of the incoming children, but many of these children never reached these institutions alive, and were therefore never registered. Pérez Moreda (2005) estimated that the real number of abandoned children may have been 10 times higher than the number admitted to foundling hospitals.
18. An interesting case in point is that of Protestant countries, where foundling hospitals imposed tighter admission policies or were not actively promoted (Ransel, 1988, p. 65).
19. Although they were probably exaggerated, local proverbs sometimes treated the death of a daughter as good news (Chapman, 1971, p.30).
20. Weber (1986, 171) argued that rural women in 19th-century France ate standing up while they were serving their husband, and only completed their meal later on, when they ate whatever was left.
21. This woman accepted the marriage arranged by her parents, but her husband seriously mistreated her. She managed to leave him after seven years despite the strong social norms against it (probably helped by the fact that she had not borne any children) and educated herself (Domínguez, 2021, pp. 7–8). Interestingly, reflecting on her childhood, she stressed that even her mother believed that educating a girl was useless.
22. On how values tend to differ from social practices, see House et al. (2004).
23. Although focusing only on adults, Curtis and Han (2021) also uses burial information from 293 rural localities in the 17th-century Low Countries to show that famines had a greater toll on females, despite their biological advantage.
24. This is also further complicated by the well-known effect of catch-up growth (see Schneider et al., 2021).

25. For exceptions using the records of prisons that admitted both males and females, see Baten and Murray (2000) or Harris (2008), among others.
26. However, due to the lack of data on child weights, most research on conditions early in life has focused on birthweights (Galofré-Vilà & Harris, 2021; Schneider, 2017).
27. More information on the Historical Household Budgets Project here: <https://www.hhbproject.com/the-project/>.
28. Obviously, the fact that the confidence interval of a particular sex ratio falls within the expected value (i.e., 105) does not necessarily mean that there was no female excess mortality. It does, however mean that we cannot rule out the possibility that this result happened just by chance.
29. More extreme child sex ratios have been found in other areas (i.e., Albania in 1919 and parts of Russia in the 18th century, among others; see Szołtysek et al., 2022a), but the lack of detailed studies prevent us from making strong inferences about those cases.
30. Such bivariate correlations should obviously be viewed with caution, especially if the sample size underlying each child sex ratio is small (see discussion below, and Szołtysek et al., 2022a).
31. In this regard, although a comprehensive study of family systems variation in the late Polish-Lithuanian Commonwealth identified highly patriarchal cultures in some areas of the country (i.e., in Belarus, which also had unusually complex multiple-family households; Szołtysek, 2015), a more quantitative analysis has found very few traces (if any) of female infanticide and/or neglect (Szołtysek et al., 2022b).
32. Consider, for instance, these two examples taken from 18th-century Eastern Europe: while sharing strong patriarchal values, some Russian locations practising agriculture exhibited highly skewed child sex ratios, while other Polesyan-Belarusian areas that relied almost solely on cattle breeding had much more balanced figures (actually all below 95; see Szołtysek et al. (2022a). While making inferences from a few scattered populations may be risky, it is also clear that ecological and subsistence patterns (ecotypes) greatly interfered with or confounded familial-demographic effects on child sex ratios.
33. In India, China, and South Korea, for instance, worshipping ancestors is a practice that can only be carried out by sons (Das Gupta et al., 2003).
34. Henrich (2020, ch. 6), however, succinctly summarised the differences between Western and Eastern Christianity in their efforts to dismantle the intensive kinship social organisations throughout medieval and early modern Europe, and to eradicate most pre-Christian moral values. On how the Reformation affected women, see Watt (2001, pp. 151–154).
35. See, for instance, Baxhaku and Kaser (1996) or Snowden (2002), among others.
36. See, for instance, how the size and composition of the sibling set influences parental division of resources and can, in turn, affect child survival (Riswick, 2018). Parity-progression rates or the sex of the last child can also shed light on parents' sex preferences for children.
37. Although these issues have received little attention from a historical perspective, a growing body of research has started to posit the key role that women, and the economic and social institutions that structured their status in society, had in economic development in pre-industrial Europe. See, for instance, De Moor and Van Zanden (2010), Foreman-Peck (2011); Humphries and Sarasúa (2012), Dennison and Ogilvie (2014, 2016), Szołtysek and Poniat (2018), De Pleijt and Van Zanden (2018) or Baten and De Pleijt (2018), among others.
38. See, for instance, the literature constructing measures of historical gender equality (Dilli et al., 2019; Gruber & Szołtysek, 2016; Karlsson et al., 2021; Perrin, 2014).
39. Another strand of the literature focuses on the potential effect on the marriage market or crime. The research agenda could also include other territories such as the history of sexuality and reproduction.

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