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»For Better or Worse, Till Death Us Do Part« – Spousal Age Gap and Differential Longevity: Evidence from Historical Demography

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A B S T R A C T

Based on a set of 2,371 family related entries dating from 1688 to 1921, the current study tried to verify longevity differentials due to interspousal age difference. For the purpose of the analysis, age-heterogamy was operationalized in terms of sample-specific marital age gap (3.2 years) with a standard deviation of 6.1 years. Based on this, five marriage groups were isolated. Female mean age at marriage experienced a slight increase over time, while the male mean at marriage decreased. This led to an appreciable narrowing of the spousal age gap. Age-homogamous unions were most prevalent in the lower socio-economic class (day-laborers, industrial workers) ($p<0.01$). In both husband-older and wife-older unions, the interspousal gap increased with marriage order. In accord with previous studies, mean age at death varied significantly by marriage group. Females, who married younger men, died later than females, who married older men. In contrast, male longevity was most depressed within age-similar marriages, while those who married older or younger wives displayed higher life spans. Overall, marriage to a younger spouse seemed to increase longevity prospects ($p<0.05$). These differentials were not exclusively a function of the marital age gap, but were affected by diverse confounders such as reproductive output and socio-economic status.

Key words: *historical demography, mate choice, interspousal age gap, longevity*

Introduction

Marriage represents one of the most popular and enduring universal human institutions governed by legal, moral and community expectations. From an evolutionary perspective, pair bonding is found in species with highly dependent young.

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Therefore, marriage may be viewed as a reproductive social arrangement, which traditionally involved the extended family[1]. As a social rite it can be traced to a few thousand years into the past. However, it is only after the 16th century that information about the underlying family formation rules becomes available at the micro level[2].

Recently, the marital relationship has gained renewed interest from demographers, epidemiologists and anthropologists due to mounting evidence that an individual's marital status may have a direct bearing on his or her morbidity or mortality profile. Coombs[3] conducted a review of more than 130 published empirical data measuring how marital status affects personal well-being. He concluded that married people live longer and are more emotionally and physically healthy. Another comprehensive analysis[4] found that the benefits of marriage prove to be stronger for women than for men. The mechanisms, which drive this phenomenon are multi-facetted. In addition to various marital fringe benefits, such as specialization and exchange of spousal labor, sharing of economic and social resources, economics of scale and connection to other social groups or institutions[5], marriage seems to encourage healthy behavior[6]. This might explain why the mortality risk of a surviving spouse following bereavement is significantly elevated even after adjusting for age, education and other predictors[7].

Besides the observed link between marital status and longevity, there is some indication that the interspousal age gap is a vital factor influencing a person's life span prospects. Rose and Bell[8] found that having a younger wife is a good predictor of longevity. Similarly, Fox et al.[9] discovered higher mortality among men married to much older spouses, while being married to younger women provides optimal mortality rates. These results were essentially confirmed by Foster and colleagues[10]. For women, the evidence is similar. Fox et al.[9] could demonstrate that a much older husband (10+ years) increases mortality, while a spouse six years younger or two years older decreases it. Likewise, Klinger-Vartabedian and Wispe[11] demonstrated that women married to younger men tend to exhibit longer life spans, while women married to older partners died sooner than expected.

The above-mentioned studies provide an intriguing scenario in which individual longevity is dependent on spousal age difference. The purpose of the current analysis is to clarify whether this phenomenon can also be detected in historical data, as the ensuing progression of sweeping changes in economy, technology and culture created a distinctive mode of everyday living which distinguishes our modern life circumstances from those of our ancestors. Particularly, the time-related changes in nuptiality regimes have to be addressed. The aim of this study is two-fold. Firstly, to examine the patterns and trends within the interspousal age gap from the early 1700's until the early 1900's, complete with an analysis of possible confounders. Secondly, to verify the link between the mate choice criterion »age« and differential longevity and to identify the basis of this relationship within the historical context.

Material and Methods

Information was derived from the village genealogies of two neighboring parishes: Dannstadt/Schauernheim (1480–1880) and Hochdorf/Assenheim (1412–1912)[12,13]. All four villages belong to the county of Ludwigshafen/Rhine – situated between the towns of Ludwigshafen, Speyer, Neustadt/Weinstraße and Bad Dürkheim – and were part of the German state of Rhineland-Palatinate. In total, 5,513 family-related entries are available. Data selection was guided by the inclusion of

information about spousal age differences at marriage, date of marriage, marriage duration and time of death. In addition, the reproductive history of the couples was taken into consideration. Based on the outlined criteria, 2,371 related entries dating from 1688 to 1921 were evaluated. Sample-specific mean age at marriage was 25.0 (± 5.7) years for females, and 28.3 (± 6.7) years for males.

For the purpose of the present study, age-heterogamy was operationalized in terms of sample-specific marital age gap (3.2 years) with a standard deviation of 6.1 years. Based on this, five marriage groups were differentiated:

Group I (n=101): Wife-older unions (6.1+ years);

Group II (n=360): Wife-older unions (1–6 years);

Group III (n=338): Age-homogamy (±1 year);

Group IV (n=960): Husband-older unions (1–6 years);

Group V (n=612): Husband-older unions (6.1+ years).

While total sample size would have suggested the use of parametric tests, certain assumptions, such as normal distribution, were questionable. Therefore, non-parametric tests were chosen, as they are often more powerful in detecting population differences. Comparisons between independent groups of sampled data were based on Mann-Whitney (two independent samples) and Kruskal-Wallis tests (several independent samples). On occasion, evidence from Regression and Correlation Analysis was incorporated. All statistical analyses were performed with SPSS 11.0.1.

Results

General observations

14% of all unions were age-homogamous, while 86% qualified as age-discrepant. Of the latter, 19.5% were female-older, compared to 66.3% male-older. Maximum age difference in a wife-older union was 30.1 years, and 41.0 years in a husband-older union. Wife-older unions were characterized by a substantially elevated female marital age, when compared to the other four groups. Males were oldest in group V, followed by group IV and group I. All group-specific differences in mean male and female marital age attained statistical significance ($p<0.001$). For more details, refer to Table 1.

Due to the fact that marriage dissolution was mainly – if not exclusively – a function of spousal death, partnership duration varied with marriage group (see Table 1). Marital duration tended to be

TABLE 1
DISTRIBUTION OF AGE-DISCREPANT UNIONS REGARDLESS OF MARRIAGE ORDER

	Marriage group (N=2371)	N	%	**MAM husband	**MAM wife	**Spousal age gap	**Marriage duration
I	Wife-older (6.1+)	101	4.3	26.8	36.9	-10.1	25.6
II	Wife-older (1–6)	360	15.2	25.5	28.4	-2.9	27.4
III	Age-homogamy (±1)	338	14.2	25.4	25.3	0.1	29.6
IV	Husband-older (1–6)	960	40.5	26.8	23.4	3.4	29.7
V	Husband-older (6.1+)	612	25.8	34.0	22.1	10.5	26.4

MAM = Mean age at marriage (in years)
** $p<0.001$

TABLE 2
DIACHRONIC COMPARISON OF FEMALE AND MALE MEAN AGE AT MARRIAGE (MAM), MARITAL AGE GAP (IN YEARS), AND PERCENTAGE OF HYPO- AND HYPERGAMOUS MARRIAGES

Epoch	N	MAM wife	MAM husband	**Age gap	Wife older (%)	Husband older (%)
1688–1749	138	24.8	29.3	4.4	22.5	67.4
1750–1799	382	24.9	28.8	3.8	20.5	67.5
1800–1849	794	25.1	27.9	2.8	23.1	64.3
1850–1899	915	25.1	28.2	3.1	15.9	68.1
1900–1922	142	24.8	27.9	3.1	15.5	61.9

** $p<0.001$

longest in age-homogamous marriages and husband-older unions (groups III and IV), while wife-older marriages displayed the shortest marital span. These differences attained statistical significance ($p<0.01$). A microanalysis (not seen in Table 1) revealed that the association between marital duration and mean age at death for males and females was highly significant ($p<0.01$) and showed a weak positive correlation for both sexes (0.615 males; 0.622 females).

Diachronic trends

Female mean age at marriage experienced a slight, albeit unstable increase over time, while the male mean decreased (see Table 2). This led to an appreciable narrowing of the spousal age gap from 4.4 years in the 18th century to 3.1 years in the early 20th century. Across time, age-homogamy showed a clear-cut gain from 10% in the earliest observed cohorts to 22% in the last decades under observation ($p<0.001$). The comparatively high incidence of age-similar unions during the 1900's is of particular interest, as the time interval only covered two decades. Overall, age-hypergamy exhibited its highest prevalence during the 1800–1849 time span. In contrast, husband-older marriages peaked during the later half of the 19th century. While these temporal trends were quite spectacular, they did not attain statistical significance.

An important confounder in historical data is introduced via temporal variation of life circumstances. In order to address this issue, mean age at death and postreproductive longevity were contrasted for each cohort (see Table 3). Postreproductive longevity is a particularly good estimate, as it is less biased by premature death due to accident or illness. When all demographic markers are analyzed over time, several trends become apparent. In terms of mean age at death as well as postreproductive longevity, males generally outlived females until the 20th century. This is in line with historical evidence. The sample also depicted a continuous rise in median survival time. All of the outlined diachronic trends attained statistical significance and confirm rising life expectancies. Overall, the analysis of temporal trends documented that across time, people lived longer and entered more age-similar marriages.

Socio-economic factors

In addition to nuptiality and fertility data, the analyzed village genealogies contained socio-economic information for each couple. Four occupational groups could be distinguished: A) landlords and academics; B) farmers, vintagers, shepherds; C) skilled artisans, merchants,

TABLE 3
DIACHRONIC COMPARISON OF SEX-SPECIFIC MEAN AGE AT DEATH (MAD), POST-REPRODUCTIVE LONGEVITY (MAD > 50) AND MEDIAN SURVIVAL TIME (IN YEARS)

Epoch	N	**MAD wife	**MAD husband	**MAD wife >50	**MAD husband >50	**Median survival (wife)	**Median survival (husband)
1688–1749	138	56.9	56.3	59.3	60.0	60.0	60.6
1750–1799	382	58.6	61.9	60.2	63.5	61.6	63.7
1800–1849	794	59.7	63.0	61.8	64.9	62.3	64.7
1850–1899	915	63.1	64.3	66.1	66.7	67.0	67.9
1900–1922	142	61.3	57.9	61.3	57.9	70.0	70.0

** p<0.01

TABLE 4
HUSBAND'S OCCUPATIONAL STATUS, MEAN AGE AT MARRIAGE (MAM), MEAN AGE AT DEATH (MAD) AND MEDIAN SURVIVAL (IN YEARS)

Occupation	N	Wife older (%)	Husband older (%)	MAM		**Age gap	MAD		Median survival	
				*Husband	**Wife		Husband	Wife	Husband	Wife
A Landlords	75	14.6	77.3	27.2	22.7	4.5	65.8	64.1	65.9	67.1
B Farmers	945	17.5	69.4	27.5	23.9	3.5	62.2	59.9	64.5	62.7
C Artisans	656	19.7	63.7	27.9	24.8	3.2	63.7	59.9	64.7	62.7
D Day-laborers	260	21.5	61.6	28.2	25.3	2.9	64.2	62.8	65.6	67.4

* p<0.05; ** p<0.01

innkeepers; D) day-laborers, farm-hands, servants and industrial workers. The classification followed Adler[14] and Knodel[15]. Female mean age at marriage demonstrated a positive association with husband's economic status. Hence, women who married wealthy men did so at a much earlier age than their counterparts. When marital age of women, who would marry farmers or skilled artisans was compared, the latter were slightly older than the former. All differences in female age at marriage attained statistical significance (p<0.001). For males a similar, albeit less-pronounced trend could be observed. Again, wealthy landowners married younger than day-laborers, and farmers married slightly sooner than skilled artisans (p<0.05). Marital age gap also displayed pronounced differences (p< 0.001). The interspousal age gap was largest between couples of the highest socio-economic status and declined markedly when compared with day-laborers. Again, the marital age gap was slightly higher in farmers than in skilled artisans. In contrast, no significant differences could be discerned when the four occupational groups were compared in terms of longevity. Somewhat surprisingly, wealthy landowners and day-laborers (both sexes) displayed higher mean ages at death, when contrasted with farmers and skilled artisans. This trend was also obvious in median survival time.

In terms of heterogamy the following trends could be discerned. All strata displayed a distinct preference for wife-youn-

ger unions. Age-homogamous unions were most prevalent (39%) in the lower socio-economic class comprised of day-laborers and industrial workers. Conversely, age-hypergamous unions were most abundant (77%) in the upper class ($p<0.01$). The four social groups also showed a distinct sex-specific patterning of the age gap ($p<0.01$). Broad and extreme age differences of several decades were most common in wealthy husband-older unions.

Overall, these results document that higher socio-economic status led to earlier entry into marriage in both sexes. Socio-economic status also influenced marital age gap, in as much as couples of higher economic standing displayed a wider age difference than couples of poorer strata. Furthermore, individuals of upper socio-economic grouping were more prone towards age-hypergamy than individuals of lower economic standing. While no statistically significant longevity differentials could be discerned between the two extremes of the economic scale, it has to be noted that differing marriage markets and hence marriage opportunities existed between the four occupational groups, which may potentially confound the relationship between spousal age gap and longevity.

Marriage order

The following analyses are based on marriage order 1 and 2, excluding 22 cases involving third or fourth unions for one of the partners. 85.2% of all marriages were first-time unions for both spouses. Overall, the preference for an older male was 66%, regardless of marriage order, with the exception of second marriages for grooms, where the incidence of husband-older unions peaked at 88%. The spousal age gap widened with successive union (compare Table 5). The observed differences were statistically significant ($p<0.001$).

First-time marriages: mean marriage age for women was 24.0 years and 26.8 years for men. Age-heterogamous unions (I–II, IV–V) exhibited a pronoun- ced tendency to consist of one partner who was below sample- and sex-specific marital age.

Previously married brides: as was to be expected, previously married females were on average four to seven years older than first-time brides. However, one noticeable exception is seen in Group I, where wives of higher marriage order (i.e. widows) were 5 years younger than females who had not been married before. This is most likely related to a quick remarriage in order to support dependent young. The age gap in wife-older unions increased with female marriage order.

Second marriages for husbands to first-time wives: men who had been married before, displayed a marked preference for a husband-older union with a broader age gap, while wife-older unions were comparatively scarce and showed a closing of the age gap.

Higher marriage order for both spouses: when both spouses remarried, gender-specific mate preferences became evident. However, in light of limited sample size, these results have to be interpreted with some caution. Women in female-older unions displayed an increasing trend towards age-homogamy, while husband-older unions showed a substantial preference towards hypergamy with extreme age gaps.

Reproductive output

Each coupling of spouses, depending on the degree of heterogamy, affected the reproductive history of the partnership in question. When the mean number of offspring was considered, groups I and II were at a strict disadvantage in terms of reproductive output ($p<0.01$). Wife-older unions were not only characterized by fewer children than age-homogamous or

TABLE 5
SEX-SPECIFIC MARRIAGE AGE AND SPOUSAL AGE GAP BY MARRIAGE ORDER (IN YEARS). NUMBERS IN PARENTHESES DENOTE SAMPLE SIZE < 20

Marr. group	Husband=1; Wife=1 (2019)			Husband=1; Wife=2 (77)			Husband=2; Wife=1 (209)			Husband=2; Wife=2 (33)		
	MAM husbd.	MAM wife	Age gap	MAM husbd.	MAM wife	Age gap	MAM husbd.	MAM wife	Age gap	MAM husbd.	MAM wife	Age gap
I	24.7	33.9	–9.2	26.1	28.8	–12.8	(34.1)	(42.1)	(–8.0)	(49.2)	(56.8)	(–7.6)
II	24.7	27.6	–2.8	27.8	31.4	–3.5	(31.9)	(35.5)	(–3.6)	(39.8)	(44.1)	(–4.3)
III	24.9	24.9	0.1	(29.4)	(29.1)	(0.2)	(29.8)	(29.5)	(0.3)	(36.9)	(36.9)	(–.01)
IV	26.1	22.8	3.3	(33.2)	(29.2)	(3.9)	32.8	29.0	3.6	(47.6)	(43.7)	(3.9)
V	31.2	21.9	9.3	(39.0)	(29.9)	(8.7)	39.7	26.0	13.7	(50.4)	(36.6)	(18.8)

MAM = Mean age at marriage

TABLE 6
COMPARISON OF MEAN AGE AT DEATH FOR PAROUS AND NULLIPAROUS COUPLES (NUMBERS IN PARENTHESES DENOTE PROSTREPRODUCTIVE LONGEVITY), AS WELL AS MEAN NUMBER OF OFFSPRING AND PERCENTAGE OF CHILDLESS COUPLES

Marriage group		Parous couples			Nulliparous couples		
		**Offspring	MAD/husband (yrs)	MAD/wife (yrs)	% Childless (N=262)	MAD/husband (yrs)	MAD/wife (yrs)
I	Wife-older (6.1+)	3.9	62.6 (68.1)	64.8 (69.2)	28.7	64.3 (69.3)	69.2 (72.9)
II	Wife-older (1-6)	4.7	62.3 (69.4)	62.6 (69.1)	8.3	66.3 (68.4)	65.3 (71.4)
III	Age-homogamy (±1)	5.0	61.6 (68.8)	62.2 (69.8)	7.7	59.4 (68.8)	67.2 (69.6)
IV	Husband-older (1-6)	5.2	63.3 (69.2)	61.6 (70.1)	9.8	62.9 (70.7)	64.8 (73.6)
V	Husband-older (6.1+)	5.1	65.0 (69.4)	59.7 (68.1)	10.3	69.4 (72.0)	63.1 (71.2)

** $p<0.01$

age-hypergamous unions, but also by more childless marriages (see Table 6). This, however, seemed to have a positive effect on female longevity ($p<0.001$), while no statistical effect could be determined in terms of male life span (see Table 6). A Cox regression demonstrated that women who had born children exhibited a 49% higher mortality risk than nullipara ($p<0.01$). Mean age at death for nullipara was 65.3 years as compared to 61.4 years in multipara ($p<0.001$). While male life spans mimicked this trend (64.8 years versus 63.4 years respectively), these differentials did not attain statistical significance.

Table 6 also documents a positive relationship between longevity prospects and a younger spouse, which can be observed in both parous and nulliparous couples. However, group-specific man ages at death did not attain statistical significance. Furthermore, the effect diminished when postreproductive longevity was analyzed.

Longevity

Mean age at death varied significantly by marriage group ($p<0.05$). Table 7 documents that females who married younger men exhibited longer life spans than females who married older spouses ($p<0.05$). Similarly, men who married younger

TABLE 7
MEDIAN AGE AT DEATH AND POSTREPRODUCTIVE LONGEVITY (IN YEARS) BY MARRIAGE GROUP

		Mean age at death		Postreproductive life span		Both > 50 years	
	Marriage group	*Husband	*Wife	Husband	*Wife	Husband	Wife
I	Wife-older (6.1+)	63.2	66.2	68.5	70.4	71.2	68.7
II	Wife-older (1-6)	62.8	62.8	69.3	69.3	69.9	70.0
III	Age-homogamy (±1)	61.6	62.5	68.8	69.8	70.2	69.3
IV	Husband-older (1-6)	63.2	61.9	69.3	70.5	70.4	69.8
V	Husband-older (6.1+)	65.5	60.0	69.7	68.4	68.5	70.3

* $p<0.05$

TABLE 8
RESULTS OF THE SEX-SPECIFIC SURVIVAL ANALYSIS (COX REGRESSION)

	Males						Females					
Factor	B	SE	Wald	df	p	Exp(B)	B	SE	Wald	df	p	Exp(B)
SES	–0.012	0.030	0.161	1	0.688	0.988	0.024	0.033	0.524	1	0.469	1.024
Epoch	–0.094	0.025	14.712	1	0.000	0.910	–0.165	0.025	44.087	1	0.000	0.848
Age gap	–0.006	0.004	2.668	1	0.102	0.994	0.013	0.004	9.442	1	0.002	1.013
Offspring	0.044	0.034	1.737	1	0.188	1.045	0.060	0.035	2.966	1	0.085	1.062

women died later than those who married older females ($p<0.05$). Taking the mean life span of age-homogamous unions as a baseline, females who married a younger husband (regardless whether group I or II) gained a little over a year, while those who entered an age-hypergamous union (group IV, V) lost 1.3 years. For males, the trends were more ambiguous. Longevity was most depressed within the homogamous group, while those who married older or younger women displayed gains in average life span. The outlined trends could also be verified in postreproductive life spans, however, only differences in female life span attained statistical significance. Overall, the positive effect of younger spouses was best observed in mean age at death.

In conclusion, epoch, socio-economic standing (SES) and reproductive outcome all affected longevity. In order to detect structure in the relationships between the aforementioned variables, all were submitted to survival analysis. The results of the Cox regression (see Table 8) confirmed that for males, the number of dependents increased mortality risks while socio-economic standing, epoch and age gap had a positive effect on survival. However, only the diachronic rise in life span attained statistical significance. When females were analyzed, socio-economic status, age gap and number of offspring increased the relative chance of death, while temporal aspects had a beneficial effect on survival. However, only epoch and age gap attained statistical significance. Interspousal age gap thus demonstrated to be a viable factor in longevity differentials – at least for wives. Having a younger spouse seemed to incur gains in life span, while a significantly older partner resulted in longevity losses.

Discussion

The current study documents a distinct interrelationship between marital age gap and longevity. Females who married younger men died later than females who married older men. These results are in accord with previous studies[8,11]. In contrast, male longevity was most depressed within the homogamous group, while those who married older or younger wives displayed higher life spans. This only replicates parts of previous findings[9,10] and poses an interesting question: how can a cultural feature be responsible for the differential expression of a biological trait such as longevity? The solution involves the acknowledgement of various confounders, foremost differential fertility and socio-economic status. However, before the interaction of these is unraveled, a cautionary note seems in order. The age gap in this and in all previous studies is based on the individual's chronological age. Yet, there is convincing evidence that longevity is significantly more highly associated with biological than chronological age[16]. Hence, age dissimilarity based on chronological age may be of little value in the assessment of actual longevity differentials.

The marital age gap: A theoretical framework

Merely 20% of the observed unions were hypogamous, while the majority were husband-older marriages (66%). This fits the patterns and trends observed in other historical populations[15,17,18]. There are many characteristics which males and females value in a potential mate, but evidence from within-country as well as cross-national analyses suggests that the interspousal age gap is not merely a by-product of separately determined distributions of male and female ages but rather that certain age differences are avoided and others preferred[19]. In order to explain this phenomenon, competing theories from evolutionary biology, psychology[20] and sociology[21–23] have been developed. From an evolutionary perspective, the most enduring scenario postula- tes that men seek women who are young and attractive, while women pursue men who are good providers[24]. In line with this hypothesis, Buss[25] found that women value a prospective mate's resource potential while men rate female partners in terms of fecundity. The latter is expressed in a preference for youth and physical attractiveness[26]. Interestingly, these sex-specific mate criteria may also entail a health advantage. Groot and Van den Brink[27] found that a positive age gap between husband and wife increases both male and female life satisfaction. As both positive as well as negative emotion-related attitudes and states are associated with physical and mental health[28,29], an emphatic attitude towards life could inadvertently lead to greater feelings of well-being and, perhaps, even greater life expectancy[30].

A second important characteristic in human mate choice is homogamy. Homogamy refers to the idea that a normative structure operates through cultural conditioning to direct people to select a mate with characteristics similar to their own. Many studies on mate selection report a strong tendency towards homogamy in both social and physical characteristics[31,32]. Thus, mate selection can result from both social homogamy (similar environment) as well as active phenotypic assortment (desired attributes). The impact of age has been widely recognized in this context[33–36]. Overall, women show a greater disposition to remarry homogamously[37]. This phenomenon might be related to future childbearing intentions. When childbearing marriages and companionship marriages are compared, it can be seen that the former tend to have a higher degree of homogamy in age

and religion, while the latter exhibit a higher educational homogamy[38].

An underlying assumption of age-homogamy is that greater differences between spouses lead to higher marital instability[35]. This is particularly evident within the historical context, where large age differences – especially if the wife is older – often entailed a higher risk of marital dissolution[39,40]. This may explain, why – despite the modern day surge in alternative lifestyles – the proportion of hypogamous unions has virtually remained unchanged[41]. In many industrialized countries the age patterns at first marriage display similar trends[42]. This underscores the general assumption that age-homogamous unions may represent the norm[43]. However, there is no precise age gap after which a couple is considered age-heterogamous. Often the magnitude of the spousal age dissimilarity is based on a subjective or qualitative judgment. Nevertheless, there have been attempts to model the optimal age difference between spouses[44] and various operational definitions of age-heterogamy have been conceptualized[34,43,45,46].

Temporal trends within the spousal age gap

The increase in age-homogamy: Age at first marriage often exhibits a considerable variation cross-regionally as well as cross-temporally. But in line with other historical studies, the current research documents that female age at marriage increased over time while male age decreased. This foreshadows the demise of the European marriage pattern, a striking peculiarity of Central and Western European history which was the result of a stylized social rule requiring young adults to defer marriage until they were able to support themselves and subsequent offspring[47], while family and community assured that the outlined conditions were met[17,48]. When industrialization and emerging capitalism liberated individuals from community constraints, the bourgeois family slowly began to emerge as a domestic microcosm. Firstly, inheritance no longer exclusively determined a couple's economic basis. Secondly, early nuptiality and high fertility became necessary components of the new family economy and life-course, and thirdly, increased family size meant more hands were available for cottage production[49]. Thus, social modernization – driven by economic developments – resulted in a more open society which in turn allowed for important changes in mate choice. Eventually, age differences between brides and grooms began to display greater homogamy[34,50–54], as the society gradually began to afford both sexes equal footing in political, economic, social and cultural developments and benefits. This is in line with Eagly and Wood[20], who show that cultures with greater gender equality display a prominent convergence between male and female mate selection criteria. In this context, age at entry into marriage has a high explanatory power[55]. Other studies document that career-oriented women, with high educational attainment[56], are more likely to choose a mate of their own age range[57].

The surge in age-hypogamous unions during the first half of the 19th century: Historically speaking, marriages were regulated to adjust to the availability of land and other resources. Marriage was a contractual agreement, which joined husband and wife as well as land and goods. For a husband-to-be, three criteria were particularly important when it came to selecting a bride: dowry, work capacity, and health – all three of which are positively related to age[58]. In line with this, Voland and Dunbar[59] could show that a female's age at marriage was predominantly influenced by her natal economic status and evidence from historical Tuscany likewise demonstrates a positive

correlation between a bride's dowry size and her age[60]. It was customary for a woman to bring a dowry into her marriage, the size of which was determined by the families of the prospective bride and groom. This dowry could consist of land, money, goods or household items. Rather than a voluntary act, it was a prerequisite for entering into marriage. In case a family was too poor to provide sufficient or appropriate funds, the young woman often had to engage in wage labor in order to earn her marriage portion[61]. While the latter may have inadvertently postponed her nuptial prospects, an older female who had accumulated sufficient savings while at service, may have been a good match for younger, money less bachelors[62]. A dowry may therefore have been a reproductive tactic to attract the wealthiest grooms[63].

Another likely scenario focuses on a shrinking pool of eligible males, which may have caused a shift to atypical or non-normative marriage partners. Smaller gaps in age at marriage often indicate that the cohorts of women at peak ages of female marriage are substantially larger than contemporaneous cohorts of men. In line with a marriage squeeze, Bergstrom and Lam[64] found that the difference in the ages at marriage between men and women responds to the relative number of men and women eligible for marriage. Similarly, Edlund[65] was able to substantiate a weak relationship between sex-ratios and interspousal age gap. Hence, a shortage of grooms due to population growth, war, or excess male migration could have forced many brides-to-be to outmarry. Two such factors can be singled out during the time period and region of concern. Firstly, during the War of the Grand Alliance (1689–1697), the troops of King Louis XIV ravaged the Palatinate, causing many of its citizens to emigrate to America[66]. Secondly, after the French Revolutionary Wars, the Palatinate was occupied and put under French primacy until 1814. Both of these struggles had profound effects on the demographic make-up of the population under study and may have led to a shortage of eligible bachelors.

Spousal age gap as a function of marriage history

The history of divorce in Germany is to a great extent tied in with the political and constitutional developments following the consolidation of the German Empire. Before this historical landmark, the provision of marital dissolution was solely guided by religious divisions. However, by the mid-19th century, legislature provided broad grounds for divorce which, in 1875, culminated in the passage of the imperial divorce law. Despite these legal changes, legislature remained essentially paternalistic and conservative[67]. Hence, the vast majority of remarriages in the current sample was due to prior bereavement rather than deliberate marital dissolution. It is interesting to note that, from a historical point of view, individuals entered a new partnership much quicker than today, as a swift remarriage guaranteed the normal working routine typical of a strict division of labor[68].

Both within historical as well as modern times, it can be observed that re-partnering after relationship breakdown follows a sex-specific pattern. These gender differences are due to sex-specific remarriage prospects and trends, which reflect given marriage market conditions[69]. The size of the age gap is, thus, often a function of individual marriage history[70]. In historical times, men were not only more likely to remarry, but did so much more rapidly[18]. To a large extent the remarriage probability of either sex was contingent upon two discrete factors. Firstly, age at bereavement[15]: female marriage prospects were mainly influenced by fecundity, where age served as a proxy for

reproductive value. The male market value was predominantly determined by earning potential and the risks involving future pair-bond dissolution[71]. Moreover, males were more likely to marry someone who was previously unwed[37]. Hence, the younger the bride, the older the husband tended to be[15]. Secondly, remarriage probability displays a distinct relationship to the age range of dependent children: children under the age of five double the remarriage risk for men[71,73]. In accord with the outlined empirical evidence, an earlier study of the sample population found that males considering remarriage were mostly influenced by the mean age of the children in their care, while women were greatly affected by the number of previous births[74].

In this context, it is also important to note that first-time brides and grooms marrying late in life are often more heterogeneous in their choice of mate[75]. Hence, the relative chance to marry homogamously decreases with rising age at marriage, and increases over historical time[76]. This indicates that the norms for age-similarity do not operate similarly across the life span[77]. In line with this, Bytheway[78] could show that mate selection is characterized by a switch in age focus around middle age. Thus, individuals in their early 50's are more apt to marry someone decidedly older than individuals in their early 30's.

The benefits of younger spouses

Older wife/younger husband – the confounder »differential fertility«: The majority of women who married a much younger husband displayed significant marital postponement, which in turn led to a noticeable decrease in reproductive output and a high percentage of childless unions. Repeated childbirth, lactation, and childrearing are stressful events in female life history. From a medical point of view, mortality differentials are indicative of a complex interaction of diverse factors relating to maternal depletion[79,80]. However, maternal depletion is often difficult to detect, as fertility, morbidity and mortality are also tied in with social and economic life conditions[81].

The current study documented that nullipara displayed longer life spans than females who had born children[37]. This is in line with the disposable soma theory[81,82], where female longevity is negatively correlated with number of progeny and positively correlated with age at first childbirth. The disposable soma theory posits that longevity is determined through the setting of longevity assurance mechanisms, as to provide an optimal compromise between investments in somatic maintenance (including stress resistance) and reproduction[83]. Because of the requirement for reproduction, natural selection favors a strategy that invests fewer resources in the maintenance of somatic cells and tissues than are necessary for survival[84,85]. Hence, women who remain childless are expected to live longer than those who reproduce. Similarly, women who have few children live longer than those who have many[86].

Older husband/younger wife – familial care vs. economic hardship: Among the many functions that families perform, health care and welfare are the most vital. However, caring is closely linked to gender. Women, regardless of whether they are wives, daughters or daughters-in-law, are the most likely to fill the role of informal caregiver for an ailing family member. Several authors[87–89] have tried to explain these consistent findings. All in all, deep seated psychological differences coupled with cultural beliefs and economic opportunities may best explain the observed gender differences. Hence, it is quite possible that older men benefited from a younger wife in as much as she was able to provide care in case of illness or impairment.

From the younger wife's point of view, the union to a much older husband incurred an enhanced risk to be without a partner in old age. Poverty affects women disproportionately throughout their lives, but particularly in their later years. In preindustrial Germany, farmers and skilled artisans were not insured and only had access to a familial retirement portion, aptly called »Altenteil«[90], which entailed the right to live on the farm after handing it over to their children. The prevailing law of partible inheritance stipulated that a widow would inherit half of the assets, while the remainder was equally divided amongst the children. Hence, for women who were disproportionately young – possibly married to a previously widowed man – the death of their spouse could have created socio-economic hardship, which adversely affected her living circumstances, legal status[91], and ultimately her life prospects[92].

Socio-economic status and interspousal age gap

While Vera and colleagues[35] document a tendency of age-disparate unions to be more prevalent in lower income strata, the current analysis as well as other historical studies show that age-heterogamy is more prevalent among the upper classes[15,62,93]. In contrast, farmers more often engaged in age-similar marriages, which could be linked to a greater occupational homogamy[94] and the role that women and children played within the agricultural and household production.

All occupational groups exhibited distinct differences in terms of age at marriage. As such, the wives of day-laborers, a group characterized by greater financial instability, were on average older than their contemporaries. This is in line with other studies[15,62,93,95] and alludes to the fact that marriage restrictions in the early 19th century caused some 6% of all marriage applications to be refused on socio-economic grounds. The strata which was most obviously affected were day laborers, apprentices and farmer's sons of higher birth order[96,97]. This is further accentuated by the fact that high-income households were characterized by the earliest female age at marriage[98,99]. The latter was probably a consequence of preferential mate selection[100] paired with parental control strategies[101]. In contrast, the wives of farmers often entered into marriage earlier than those of craftsmen[95]. This indicates that socio-economic status had a direct bearing on the age gap between spouses.

One surprising outcome of the current study was the fact that age-similar marriages seemed to convey a detrimental effect on male life span prospects. However, a closer look suggests that the depressed life expectancy of males in age-homogamous unions was caused by the confounder socio-economic background, which may have lead to premature death in this particular group. This does not necessarily mean that life expectancy in the lower socio-economic strata was generally depressed (as can be documented via post-reproductive life spans), but more individuals of lower socio-economic standing died premature than any other group. Living in poverty during childhood influences health in later adult life[102]. Hence, economic status is a strong and consistent predictor of morbidity and premature mortality. Furthermore, while »being poor« may be regarded as a relatively simple concept, the assessment of poverty is often subjective and clouded in conceptual and methodological uncertainties. However, the evidence on the substandard life circumstances of day-laborers is convincing. As a group they often belonged to the landless class[103] which often led to social as well as locational marginalization[27]. The adverse effect of living in a poor neighborhood is the result of two factors: poor housing and contaminants. Residential segregation not only leads to

a differential experience in terms of disease and risk exposure but also to morbidity disparities via differential access to economic, social, and physical health resources. This is further enhanced by income uncertainty due to temporary employment, low income, and fragile attachment to prospective employers. In summary, it is hypothesized that the longevity differentials in relation to males who married a partner of equal age were confounded by a socio-economic effects on morbidity and mortality, rather than a direct consequence of age-homogamy.

Synopsis: Spousal age difference and its link to longevity

The results of the study indicate that spousal age gap is one of several factors, which influenced individual longevity prospects. Over time both sexes experienced a considerable increase in life expectancy, which attained statistical significance. This rise in longevity was paralleled by a narrowing of the interspousal age gap. Both of these phenomena were byproducts of social modernization driven by economic developments. Still, male-older unions remained the preferred standard, particularly among the higher socio-economic strata, which continued to show a distinct preference for hypergamy and very young brides. Overall, selecting a much younger partner conveyed a mortality advantage. The underlying mechanisms were most likely related to differential fertility, familial care-giving and economic security.

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»U DOBRU I ZLU, DOK NAS SMRT NE RASTAVI« – RAZLIKA U STAROSTI SUPRUŽNIKA I DUGOVJEČNOST: DOKAZI IZ POVIJESNE DEMOGRAFIJE

S A Ž E T A K

Studija analizira 2371 obiteljski zapis iz razdoblja od 1688. do 1921. godine, na kojima se pokušalo pokazati razlike u dugovječnosti na temelju razlike između starosti supružnika. Na temelju razlike dobi od 3,2 godine i standardne devijacije od 6,1

godinu, razlike u starosti supružnika podijeljene su u 5 kategorija. Srednja dob žena na vjenčanju pokazuje blagi porast tijekom navedenog perioda, dok isti broj kod muškaraca pokazuje pad. Ovo dovodi do sužavanja razlike u starosti supružnika, Starosno-homogamne zajednice su najčešće u nižim socio-ekonomskim uvjetima (radnici, industrijski radnici) ($p<0.01$). U zajednicama gdje je jedan supružnik stariji, razlika u starosti raste s redoslijedom vjenčanja. U skladu s prijašnjim studijama, prosječna dob smrti je znatno varirala u raznim grupama. Žene koje su imale mlađe muževe umirale su kasnije nego one koje su imale starije muževe. U suprotnosti s tim, dugovječnost muškaraca je bila najmanja u brakovima s istodobnim ženama, dok su brakovi u kojima su muškarci bili mlađi ili stariji rezultirali dužim životnim vijekom muškaraca. Sumarno gledano, udavanje za mlađeg partnera dovodi do povećane vjerojatnosti dugovječnosti ($p<0.05$). Ove razlike nisu rezultat isključivo razlike u starosti supružnika, nego su na njih utjecali i drugi čimbenici, poput reproduktivnog statusa i socio-ekonomskog stanja.