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MUCH OF THE research on life-course determinants of later life health has focused on cumulated effects of socioeconomic disadvantage (Ben-Shlomo and Kuh 2002; Luo and Waite 2005). Family life courses also involve differential exposures to stresses and supports and interact with other health-relevant domains including socioeconomic status, health-related behaviors, and social support (Barban 2013; Grundy and Read 2015). The transition to parenthood is a pivotal life-course event whose timing and context may have implications for subsequent family and socioeconomic trajectories and for health (Knoester and Eggebeen 2006; Mirowsky 2002). Numerous studies of contemporary Western populations indicate that an early age at entry to parenthood is associated with poorer health and higher mortality in later life.

Several processes are hypothesized to underlie this association between early parenthood and poorer later health. For women, pregnancy, parturition, and lactation present physiological challenges that may be greater for young mothers (Pirkle et al. 2014). Young mothers and fathers may also be less resilient in the face of the physical, emotional, and economic stresses involved in raising children and have fewer stress-buffering resources (Barban 2013). Additionally, early parenthood may disrupt educational and career progression and increase the chances of divorce and of high completed family size, all factors associated with socioeconomic disadvantage, health-damaging stress, and poorer later life health (Ermisch and Pevalin 2005; Grundy and Read 2015; Hofferth et al., 2001). Apart from these potential causal mechanisms, an additional, or alternative, explanation for associations is deprivation experienced earlier in life, given that childhood disadvantage is associated with increased chances of early parenthood and with poorer socioeconomic outcomes and poorer health in later years (Henretta 2007; Hobcraft 2008; Maughan and Lindelow 1997; Pudrovska and Carr 2009; Sigle-Rushton 2005).

These linkages between early parenthood and later health may depend on contextual factors that vary between regions, countries, and population subgroups. For example, whether early childbearing is regarded as problematic or normative will influence selection into early parenthood and health-relevant aspects of the circumstances, status, and future life chances of young parents (Koropeckyj-Cox, Pienta, and Brown 2007; Maughan and Lindelow 1997). Cross-national studies may provide insights into the extent to which associations between early parenthood and poorer later health are universal or context specific. Comparisons between Eastern and Western Europe are of particular interest because of the longstanding pattern of earlier female marriage and fertility in the East, which implies less selection into early motherhood (Hajnal 1965; Frejka and Sardon 2004). Additionally, in the state socialist regimes of the former Soviet Union and Eastern bloc countries, female education and employment were encouraged, the state provided childcare, housing, and other family benefits, and returns from better education in terms of occupational advancement or higher income were lower than in the West (Katz 1999; Klesment 2013; Muresan et al. 2008; Stankuniene and Jasilione 2008; Zakharov 2008). All of these factors may have reduced disadvantages resulting from early parenthood.

In this article we extend the literature on long-term health implications of early parenthood by comparing associations in Western and Eastern Europe using retrospective life-course data for 11 countries included in the Generations and Gender Surveys. We examine associations between early parenthood and self-rated health among women and men aged 50–80, taking account of childhood circumstances that may influence both entry to early parenthood and later health, and intermediate outcomes relevant to health, such as experience of divorce and adult socioeconomic status. We also investigate whether early age at first birth in itself or deviation from societal norms appears to be the more important influence on health in later life by undertaking analyses using indicators of age at first birth measured in absolute terms (chronological age) and relative to the mean for the relevant country and birth cohort. We examine effects for both women and men to shed light on the extent to which associations may be biologically or socially influenced.

Background

Early parenthood and later life health and mortality

Delayed motherhood and childlessness are well-established risk factors for breast cancer and some other hormonally related cancers (Kvale, Heuch, and Nilssen 1994). Nevertheless, previous research mainly based on the United States or Western European countries has shown that early motherhood, generally defined as first birth before age 20 or 21, is associated with poorer later life health outcomes. These include higher overall mortality

risks (Doblhammer 2000; Grundy and Kravdal 2008; Grundy and Tomassini 2005; Henretta 2007), greater risk of chronic disease and disability (Grundy and Tomassini 2005; Henretta 2007; Read, Grundy and Wolf 2011), and poorer general health (Grundy and Read, 2015; Hărăguş 2011; Koropeckyj-Cox, Pienta, and Brown 2007). Some of the fewer studies of men have reported similar, though generally smaller, adverse associations between early fatherhood and mortality (Einio et al. 2015; Grundy and Tomassini 2006; Grundy and Kravdal 2008) or long-term illness (Grundy and Read 2015). However, Hank (2010) found no association between timing of fertility and the health of older men in Germany, and Pudrovska and Carr (2009) reported that the association between age at first birth and the health of US men in mid-life was accounted for by differences in socioeconomic and family status.

Variations in findings for different populations or population subgroups indicative of contextual influences have been reported in some studies. Spence and Eberstein (2009), for example, found that early childbearing among white US women was associated with higher later life mortality, while it was associated with lower later life mortality among black women; moreover, this latter effect persisted after consideration of mediating social, economic, and health-related factors. Hank (2010) reported an association between early motherhood and later poorer health for women in West, but not East, Germany, a difference he hypothesized might reflect the fact that early childbearing was more "off track" in West Germany.

Specific biological processes may partially explain the poorer later life health outcomes of young mothers reported in these studies. For example, reduced resilience in the face of challenges to nutritional reserves arising from pregnancy, childbirth, and lactation may jeopardize bone density, and bone and pelvic floor damage associated with difficult births are more common among young mothers (Christensen et al. 1998; Pirkle et al., 2014). However, the fact that associations have been found between early fatherhood and poorer later life health for men indicates the importance of broader biosocial processes such as those related to selection into early parenthood, the socioeconomic and sociodemographic consequences of early parenthood, and possible reduced resistance of young parents to these stresses—all factors that may be influenced by context.

Limitations of previous research include the fact that not all studies took account of antecedent circumstances that influence both timing of parenthood and later life health, and some may have lacked sufficient statistical power to detect potentially important associations. Moreover, most previous research has focused on the US or a small number of Western European countries and considered only one or, in a few cases, two or three countries (Doblhammer 2000; Hank 2010; Pirkle et al. 2014). With two exceptions (Hank 2010; Hărăguş 2011), there has been little study of associations in Eastern European countries. The large differences in the political, social, economic, and demographic histories of Western and Eastern Europe over

the twentieth century, including a pattern of earlier childbearing in the East, make comparisons of associations between early childbearing and later life health potentially informative about underlying mechanisms and relevance of contextual influences.

Eastern and Western European contrasts

Fifty years ago Hajnal (1965) posited a long-term historical division of Europe according to patterns of nuptiality prevalent for several centuries until the 1940s. Regions to the east and south of a line running roughly from Trieste to St. Petersburg were characterized by early and near-universal marriage and fertility for women, with large age gaps between husbands and wives, in contrast to countries to the north and west where female marriage and parenthood were later, age gaps between spouses were smaller, and substantial proportions remained unmarried. Although it is recognized that the "Hajnal line" is an over-generalization, in broad terms this differentiation persisted into the second half of the twentieth century (Coleman 1996). In the 1950s and 1960s the post–World War II baby boom, when ages at first birth fell and fertility rates rose, was a feature of Western Europe but was more muted in Eastern Europe (Sobotka and Toulemon 2008) and absent in the Baltic states (Frejka et al. 2004). East–West differences narrowed for a time but then diverged again from the late 1960s when fertility and marriage rates declined and ages at first parenthood increased in many Northern and Western European countries. Eastern European countries also experienced declines in overall fertility after 1960, but little postponement of marriage and first birth until after 1990 (Berent 1970).

In addition to differences in marriage patterns, other proximate determinants of fertility have also varied between East and West, including the availability and use of different methods of birth control (Frejka 2008). Modern contraceptives became available in the West in the 1960s, and liberalization of abortion laws generally followed in the 1970s or 1980s (Rahman, Katzive, and Henshaw 1998). In the former Soviet Union, Stalin attempted to overturn previously liberal abortion laws in an effort to raise fertility, but this policy was abandoned by 1955 after which abortion became freely available and a predominant means of birth control in both the Soviet Union and other Eastern bloc countries (Zakharov 2008). Pro-natalism prompted new restrictions in some countries at times, most notoriously in Romania.

Western and Eastern Europe have also had divergent patterns of mortality and health. In the early twentieth century there was a clear East–West divide, with much higher mortality in the East (Caselli 1994). After World War II, mortality in the Soviet Union and other Eastern European countries improved substantially and to a greater extent than in the West, leading to some narrowing of the gap during the 1950s and 1960s (Meslé 2004;

Murphy 2011). However, from the 1970s onward, mortality in the West began a renewed decline, in contrast to stagnation, particularly in male mortality, in the East leading to a wider divergence exacerbated by the sharp increase in adult mortality following the collapse of the Soviet Union (Murphy 2011).

Research questions

The main aim of this study is to establish whether early parenthood was associated with poorer health at ages 50–80 in selected Eastern and Western European countries, taking account of both childhood circumstances and adult sociodemographic characteristics. We examine variations in later life health in models to which we add childhood circumstances, education, and adult sociodemographic characteristics in sequential steps. We initially present analyses showing associations between childhood circumstances and early parenthood, and associations between early parenthood and adult sociodemographic characteristics. A related aim is to compare the effect of early parenthood measured in absolute and relative terms to gauge the importance of possible disadvantage and selection related to non-normative reproduction. We expect that early motherhood, measured in absolute terms, will be less strongly associated with childhood disadvantage in Eastern than in Western countries because of greater cultural acceptance of early motherhood in the former, but that selection into early motherhood measured in relative terms would be similar in East and West. We also hypothesize that both early motherhood and, to a lesser extent, early fatherhood will be less strongly associated with adult outcomes, such as occupational status and experience of divorce, in the East because of weaker selection into early parenthood, greater past state supports for families with children, and weaker links between educational attainment and occupational advancement and income during the Soviet era. Weaker associations between childhood disadvantage and early parenthood and between early parenthood and adult outcomes imply—if these mechanisms are important—a weaker association between early parenthood and later health in the East than in the West. However, other influences might have the opposite effect. The probable worse nutritional status of young women in poorer Eastern countries, for example, might have made early motherhood more physically challenging, and harsher socioeconomic conditions and poorer health care might compound cumulated stresses linked to early parenthood for both women and men.

     In this connection recent and past divergences between East and West may be relevant. Populations in Eastern countries experienced the disruption and economic hardships attendant on the collapse of the Soviet Union at the end of the 1980s. The Western countries considered all have well-established social protection schemes, high income levels, and

low mortality. The Eastern countries have much lower levels of GDP per capita and higher mortality. The lesser availability in Eastern countries of compensating supports for individuals facing socioeconomic or health challenges in the 1990s might have further reinforced disadvantages linked to life-course experiences, including early parenthood. The relevance of such recent or current conditions has been demonstrated by the rapid declines in mortality observed in the former East German population following re-unification (Gjonca, Brockmann, and Maier 2000).

We first analyze associations between indicators of childhood circumstances and early age at entry to parenthood in order to examine regional differences in selection into early parenthood. We then examine associations between early parenthood and later outcomes that might mediate associations with health. For this purpose we select three indicators that are associated with early parenthood and with health at older ages: respondents' (current or last) occupational class, experience of divorce, and eventual family size of four or more children. In the final step we analyze associations between early age at parenthood and health in a series of models sequentially adding controls for these childhood and adult circumstances.

Data and methods

The analyses are based on wave 1 data from the Generations and Gender Survey (GGS), a cross-national survey of nationally representative samples of respondents aged 18–79 (Vikat et al., 2007). Respondents were asked about current circumstances, including health status, and for retrospective information on childhood circumstances and life-course trajectories, including fertility history. The GGS has been fielded in 16 European countries and details of sampling and fieldwork procedures have been reported elsewhere (Fokkema, Kveder, and Liefbroer 2014; Vikat et al. 2007). We excluded five countries that were restricted to adults aged under 65 or that lacked relevant variables. We used harmonized data from the remaining 11 countries and divided them into Western (Belgium, France, Germany (W), Netherlands, Norway) and Eastern groupings (Bulgaria, Georgia, Lithuania, Poland, Romania, and Russia) along geo-political lines. We divided the data for Germany into former Eastern and Western states. This had to be done on the basis of residence at time of interview. We included respondents from West Germany in the Western group but excluded the small sample from East Germany as since reunification they have experienced the policies and resources available in the West. Data were collected between 2003 and 2011, with seven of the 11 countries fielding the surveys in 2004–6. The overall (all-age) response rate in these 11 countries was 61 percent, ranging from 42 percent in Belgium to 86 percent in Romania; previous analyses indicated some underrepresentation of young people (aged 18–34); men; and

the less well educated (Fokkema, Kveder, and Liefbroer 2014; Vikat et al. 2007).

We undertook quality checks on the fertility history reported by older people in the GGS sample by comparing it with information on completed fertility (number of children per women) available for birth cohorts from 1930 to 1958 from the Generations and Gender Program Contextual Database (Spielauer 2004). In line with other investigations of the whole GGS sample, respondents' reports of number of children ever born were slightly lower than those presented in the contextual database, particularly in Romania (Appendix 1).* This may reflect lower survival to ages 50–80 among higher-parity mothers (estimates in the contextual database are largely derived from historic vital registration data, whereas the GGS estimates are obviously drawn from those who survived to be included in the surveys). However, there may also be some underreporting of children, perhaps particularly of dead or abandoned children. Romania under the Ceauşescu regime had much higher maternal mortality (much of it related to illegal abortion) than other European countries (Frejka 2008) and also high infant mortality and some abandonment of children; in 1990 an estimated 3–4 percent of children under age 14 were in institutions (Stephenson et al. 1992). We also compared distributions by self-rated health in the GGS with results from the Surveys of Health, Ageing and Retirement, and there was close correspondence between surveys for countries included in both (Keenan, Foverskov, and Grundy 2016).

We present some descriptive analysis for individual countries, but in most of the analysis we pool data into our Western and Eastern groups as country-level analyses would have lacked sufficient statistical power. Given the large differences in standards of living and early motherhood within the Eastern countries, we performed additional analyses distinguishing the poorer South Eastern countries (Bulgaria, Georgia, and Romania) from the rest (Lithuania, Poland, and Russia). We further stratified the sample into those born 1923–44 and those born 1945–61. Apart from differences in age at time of the GGS surveys, these groups had divergent experiences. In particular the earlier-born lived through World War II, which had large impacts throughout and beyond Europe, with particularly heavy casualty tolls and devastation in the former Soviet Union, Poland, and Germany. Results from these stratified analyses are not presented but we comment on any notable differences between cohorts.

Respondents aged 50–80 with one or more biological children and complete information on relevant variables were included in the analytical sample, which comprised 21,500 women and 17,200 men born between 1923 and 1961.

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*Appendixes are available at the supporting information tab at wileyonlinelibrary.com/journal/pdr.

Measures

The primary variable of interest, early parenthood, was measured using two binary indicators: an absolute measure where early parenthood was categorized as first birth before age 20 for women and age 23 for men, cut-points used in previous studies (Doblhammer 2000; Grundy and Kravdal 2008; Henretta 2007), and a relative measure where early parenthood was defined as more than one standard deviation below the country and cohort mean age at first birth (5-year intervals) for women or men. These measures were based on information collected on month and year of birth of the oldest living child and so exclude births of deceased children. All analyses include an indicator of whether respondents had a child who died, as a partial control for possible bias arising from this omission. Experience of the death of a child is likely to be associated with parental health, both because of intergenerational continuities in health and because of the traumatic effect of a child's death, and so is of interest as a co-variate in its own right.

Childhood circumstances and educational level. Indicators of childhood circumstances were respondents' reports of parents' highest level of education, parents' occupation, and parental presence in the childhood home. Parental presence was assessed by a dichotomous question: "Did you live most of your childhood up to the age of 15 with both of your own biological parents?" Educational data were coded using the International Standard Classification of Education (ISCED-97). For parental education, we distinguished between those with low levels of education (ISCED 0–2: no education, primary, and lower secondary) and those with medium (ISCED 3–4: upper secondary and non-tertiary post-secondary) or high (ISCED 5–6: tertiary) levels. Occupational data in the GGS were coded using the International Standard Classification of Occupations (ISCO-88). We used the one-digit codes to classify parents' occupation when respondents were aged 15 as either white collar (ISCO 1–5) or blue collar, including those working in agriculture (ISCO 6–9).[1] Appendix 2 shows the occupation classes covered by the different ISCO codes and indicates how we coded the data from the German survey, which used a different classification system. When information on education or occupation was available for both parents and was discordant, we chose the higher. Respondents' own educational level was coded using the ISCED classification described above, but we distinguished three groups (high, medium, low) rather than two as for parental education.

Adult intermediate outcomes. Three binary measures of adult life outcomes that may mediate associations between early parenthood and later health were considered: having four or more children, having ever divorced, and last or current occupation being white collar or not. Respondent's last or current occupation was coded as white collar (non-manual) or blue collar

(manual) in accordance with the variable for parents' occupation. Home-makers, long-term ill or disabled people, retired people without a job before retirement, and others with no history of employment were categorized as non–white collar.

Health. Self-rated health (SRH) was the main measure used to assess the respondent's health status. Respondents were asked whether they considered their general health to be very good, good, fair, bad, or very bad. This question, widely used in surveys, has been shown to be an independent predictor of mortality within populations (Idler and Benyamini 1997), despite differences between social groups and between countries in how people assess SRH (Dowd and Zajacova 2010). After we established that results using an ordered response category and a dichotomized variable were substantially the same, SRH was dichotomized into good (very good and good) versus fair/bad (fair, bad, and very bad). Response categories in the Norwegian survey ranged from excellent to poor, so in this case respondents reporting excellent, very good, or good health were considered to have good SRH, while respondents reporting fair or poor health were considered to have fair/bad SRH. We undertook parallel analyses using reported presence of long-term or chronic illness. While space constraints preclude full presentation of results using this indicator (which were very similar to those using self-rated health), some are presented in brief.

Other covariates. Age, measured in single years and treated as a continuous variable, and country dummies to control for differences in country-level factors associated with the outcomes were included in all models. Other covariates included were a binary indicator of whether respondents were married at the time of the survey and a binary indicator of whether they were living with a spouse or partner at the time of their first birth. These were included because of known associations between marital status and health (Goldman, Korenman, and Weinstein 1995) and because previous studies suggest that associations between early parenthood and later health may vary according to whether the birth occurred within a co-resident partnership (Koropeckyj-Cox, Pienta, and Brown 2007).

Analytical strategy and statistical analysis

In the first stage of the analysis we used multivariable logistic regression to estimate the association between childhood circumstances and early parenthood. We then analyzed associations between early age at entry to parenthood and self-rated health by fitting a series of models adding groups of co-variates in conceptually related blocks. Model 1 included age at first birth and age. We then added childhood circumstances (Model 2) and education and whether the respondent was co-resident with a partner at first

birth (Model 3). Finally, Model 4 additionally included indicators of adult life outcomes (experience of divorce, high parity, and occupational status) together with current marital status. All models included the indicator of whether respondents had a child who had died and country fixed effects (country dummies) to take account of country-level heterogeneity. We used a fixed-effects approach rather than fitting multilevel models because we only had data for 11 countries, and results from multilevel models may be biased if there are fewer than 20 or even 30 higher-level units (Bryan and Jenkins 2016; Maas and Hox 2005). We compared parameter estimates for the country groupings by fitting models for the whole sample including interaction terms, and we report on any significant differences. All analyses were carried out separately for men and women. We adopted a conservative approach and used robust standard errors throughout to allow for clustering of data within countries.

Missing data. Our models are based on the sample with complete information on all variables and exclude 18.2 percent of women and 17.6 percent of men with missing data. As might be expected, information on childhood circumstances was most often missing. Measures of parents' occupation were not reported by between 4.2 percent (West Germany) and 11.5 percent (Georgia) of national sample members, and parents' educational level was missing for 2.3 percent of respondents in Romania to as many as 18.0 percent in Russia. For all other measures the proportion of missing data in each country was generally below 2 percent and never above 6 percent, with the exception of respondents' own occupation in Norway where the proportion missing was 18 percent. Excluding cases with missing information reduces sample size and precision of estimates and may bias results. We checked for this by repeating the analysis using multiple imputation (Little and Rubin 2002). Results were highly consistent with the results from the complete case analysis. These results, together with more information on the procedures used, are presented in Appendix 3.

Results

Characteristics of the study populations

Table 1 presents descriptive information on key variables for the 11 countries in Western and Eastern Europe. The proportion of women who had their first child before age 20 was highest in Bulgaria and Romania. Poland and Georgia also had higher proportions of women who were teenage mothers than any of the Western countries considered, although Lithuania had the lowest proportion. The proportion of men who became fathers before age 23 was highest in Russia and Bulgaria and lowest in the Netherlands, Georgia, and Lithuania. As would be expected, the differentiation

TABLE 1 Percent of sample with an early age at first birth, fair, bad, or very bad self-rated health, and long-standing illness: selected countries in Western and Eastern Europe

	West					East (N)			East (S)		
	Belgium	France	Germany[a]	Netherlands	Norway	Lithuania	Poland	Russia	Bulgaria	Georgia	Romania
Women											
Age at first birth < 20	6.2	10.5	8.9	6.0	11.3	6.1	12.8	8.6	17.6	11.5	16.9
AFB > one SD below mean	12.2	10.5	10.9	13.9	13.4	12.8	11.6	12.4	11.0	10.7	11.4
Fair/bad self-rated health	31.4	41.3	36.7	31.6	31.4	84.1	69.4	94.7	68.0	89.2	68.6
Has long-standing illness	32.6	39.0	29.7	43.5	43.5	47.9	59.9	67.4	53.8	50.3	43.8
N	970	1,770	1,149	1,328	1,940	1,424	4,870	2,224	1,640	1,690	2,563
Men											
Age at first birth < 23	10.6	14.5	12.5	9.4	15.9	9.7	15.1	17.5	16.6	9.6	12.9
AFB > one SD below mean	10.0	9.1	9.7	11.7	12.4	11.1	8.8	9.7	10.5	12.1	12.5
Fair/bad self-rated health	27.7	36.4	40.6	23.1	29.1	75.3	61.3	84.1	53.0	79.8	56.6
Has long-standing illness	29.1	42.0	32.5	36.0	36.1	41.0	49.4	49.8	42.4	39.6	33.0
N	981	1,485	1,072	1,067	1,859	1,420	3,192	1,036	1,656	1,227	2,198

[a]West Germany
Abbreviations: AFB = age at first birth, SD = standard deviation
SOURCES: Analysis of GGS.

between East and West was less clear when considering the relative measure of early parenthood, particularly for men. Consistent with other studies (Carlson 2004), the proportions reporting fair or poor self-rated health, or long-standing illness, were substantially higher in Eastern than Western Europe, particularly in Russia and Georgia, and women reported higher levels of poor self-rated health than men.

Descriptive information for the Western and Eastern country groupings on variables used in the analysis is presented in Table 2. The mean age of women and men in the sample was 62–63 in all regional groupings. Compared with the Western group, respondents from the Eastern countries, particularly those in the South East, included higher proportions whose parents had low education and blue collar or farm occupations. The proportion who did not live with both parents for most of their childhood was also higher in the East than the West, particularly in the North East countries, which have high excess male mortality and were also most seriously affected by World War II. (In all regions, but particularly the North East, the proportion who did not live with both parents for most of their childhood was higher among those born before World War II). Among men the proportion with high levels of education was higher in the West than the East (and was particularly low in the South East). For women the proportion with high levels of education was similar in the West and the North East, but lower in the South East, and the proportion with low education was higher in the South East and West than in the North East. Respondents from the West were more likely than those from the East to have had a non–white collar occupation themselves. Fewer respondents in the South East had experienced divorce or did not live with a partner when their first child was born, while the proportion with four or more children was lowest in the North East. Fewer respondents in the West had experienced the death of a child. More women than men reported the death of a child, because their children would on average have been born earlier than those of male respondents (because of gender differences in fertility timing), but some underreporting by men is also possible. Fewer women in the North East were currently married, reflecting greater excess male mortality in these countries, particularly Russia. As already noted for separate countries, levels of poor or fair self-rated health were much higher in the East than the West, and higher among women than men.

Childhood circumstances and early parenthood

Results from logistic regression analyses of associations between childhood disadvantage and early parenthood for women and men in each region are shown in Table 3. Statistically significant differences between models for West and East in the extent of associations are indicated in bold.

TABLE 2 Descriptive information for all variables included in the analysis by country group (percent except as noted)

	Women				Men			
	West	East (N)	East (S)	All East	West	East (N)	East (S)	All East
Age, mean (SD)	62.2 (8.4)	62.8 (8.3)	62.7 (8.4)	62.8 (8.4)	62.3 (8.3)	62.4 (8.2)	62.6 (8.6)	62.5 (8.4)
Age at first parenthood								
< 20 (female) / 23 (male)	9.0	10.6	15.5	12.6	13.1	14.2	13.3	13.8
> one SD below mean	12.2	12.0	11.1	11.6	10.7	9.5	11.8	10.6
Not living with partner at first birth	14.4	11.4	8.9	10.4	10.0	8.5	6.1	7.3
Any dead child	6.0	9.2	7.8	8.7	4.8	5.5	5.9	5.7
Childhood factors								
Parents' educational level: Low	59.8	74.2	79.5	76.4	59.9	73.4	81.8	77.3
Parents' occupation: Blue collar	54.2	71.7	79.0	74.7	56.2	73.4	80.0	76.5
Did not live with both parents in childhood	6.2	14.2	8.2	11.7	5.9	11.2	7.4	9.4
Own educational level								
High	21.6	20.6	14.1	18.0	30.7	20.5	18.3	19.5
Medium	37.5	50.1	38.7	45.4	41.4	55.4	47.1	51.4
Low	40.9	29.3	47.2	36.6	27.9	24.1	34.7	29.1
Adult life outcomes								
Non–white collar occupation	36.6	44.9	60.9	51.4	40.6	68.1	67.4	67.8
Ever divorced	19.9	16.7	6.2	12.4	17.6	13.0	7.1	10.2
4+ biological children	14.0	10.5	11.3	10.8	13.4	8.8	9.6	9.2
Not currently married	36.0	49.0	38.1	44.6	18.9	18.2	14.2	16.3
Self-rated health fair/poor	34.8	78.5	74.4	76.8	31.5	69.0	61.0	65.2
Has long-term illness	38.7	59.9	48.4	55.2	35.8	47.3	38.1	42.9
N	7,157	8,518	5,893	14,411	6,464	5,648	5,081	10,729

West: Belgium, France, (W) Germany, Netherlands, Norway; East (N): Lithuania, Poland, Russia; East (S): Bulgaria, Georgia, Romania.
SD = standard deviation.

TABLE 3 Odds ratios from logistic regression analysis of associations between childhood circumstances and early age at parenthood

	Women				Men			
	Age at first birth below 20		Age at first birth >one SD below mean		Age at first birth below 23		Age at first birth >one SD below mean	
	West	East	West	East	West	East	West	East
Age	0.97**	0.98	**0.98***	**0.99****	**0.97***	**0.98	1.00	1.00
Parents' occupation: Blue collar	1.36**	1.54***	1.46**	1.55***	**1.43**	**1.29***	1.44***	1.38***
Parents' education: Low	1.96***	1.53***	1.85***	1.60***	1.42*	1.15	1.30***	1.21
Did not live with both parents in childhood	1.53*	1.55**	1.49**	1.34	1.12	1.12	1.14	1.14
N	7,157	14,411	7,157	14,411	6,464	10,729	6,464	10,729

*p<0.05, **p<0.01; ***p<0.001. SD = standard deviation. Bold indicates significant difference between West and East (p<0.05). Tables including confidence intervals available on request.
Reference categories: Parents' occupation white collar; parents' education medium/high; respondent lived with both parents for most of childhood. Models include country fixed effects and dead child indicator.
West: Belgium, France, (W) Germany, Netherlands, Norway; East: Bulgaria, Georgia, Lithuania, Poland, Romania, Russia.

Odds of early parenthood, whether measured in absolute or relative terms, were higher for both women and men whose parents had blue collar (including farm) occupations; for men this association was stronger in the West than the East when the absolute indicator of early parenthood was considered. Thus, odds of becoming a young father for men in the West whose own parents had a blue collar occupation were 43 percent higher than for those whose parents had a white collar occupation (the reference category). In the East the higher odds associated with parents' blue collar occupation was 29 percent. Low parental education was also associated with higher odds of early parenthood. In the West the odds of early motherhood were nearly twice as high for women whose parents had a low, rather than medium or high, level of education. Women who did not live with both parents for most of their childhood also had higher chances of early motherhood. There was a general negative association between older age and early parenthood, which reflects the higher rates of early parenthood in later-born cohorts.

Early parenthood and adult life outcomes

We now examine associations between early parenthood and three adult life outcomes that might mediate associations with later health, using logistic regression models that include indicators of childhood circumstances, respondents' own educational level, and whether respondents were living

TABLE 4 Odds ratios from logistic regression analysis of associations between early age at entry to parenthood and adult life outcomes

	Women				Men			
	Age at first birth below 20		Age at first birth > one SD below mean		Age at first birth below 23		Age at first birth >one SD below mean	
	West	East	West	East	West	East	West	East
4+ children	2.15***	1.91***	2.28***	1.88**	**2.10***	**1.63***	**2.44***	**1.70***
Ever-divorced	**2.25***	**1.30*	**2.12***	**1.29*	**1.42***	**1.27*	**1.51***	**1.19*
Non–white collar occupation	**1.18*	**1.06	**1.23***	**1.05	**1.18	**0.98	1.26	0.91
N	7,157	14,411	7,157	14,411	6,464	10,729	6,464	10,729

*p<0.05, **p<0.01; ***p<0.001. SD = standard deviation. Tables including confidence intervals available on request.
Reference categories: <4 children; never-divorced; white-collar occupation. Models include age, parents' occupation, parents' education, whether lived with both parents in childhood, own education, whether living with partner at first birth, dead child indicator, and country fixed effects.
Bold indicates significant difference between West and East (p<0.05).
West: Belgium, France, (W) Germany, Netherlands, Norway; East: Bulgaria, Georgia, Lithuania, Poland, Romania, Russia.

with a partner at the time of the first birth. Table 4 shows that in both West and East early parenthood was positively associated with high parity; for men this association was stronger in the West than the East. Early parenthood was also more strongly associated with divorce in the West than the East for both men and women. In the West, but not the East, early parenthood was associated with slightly higher odds of non–white collar occupation. Cohort-specific analysis (not shown) indicated that the associations between early motherhood, divorce, and occupation largely reflected the experience of women born after 1946, who had higher rates of divorce and employment outside the home. Other co-variates included in the models (not shown) were also associated with the outcomes considered, with some differences between East and West. For example, lower levels of education were positively associated with high parity and with non–white collar occupation, in both cases to a greater extent in the West than in the East.

Early parenthood and later life health

Table 5 shows associations between early parenthood and later life fair or poor self-rated health from a series of models including sequentially added groups of variables, as described in the notes to the table. Addition of each group of variables resulted in an attenuation of the association between early parenthood and self-rated health. Most of the difference between Models 2 and 3 was due to the addition of respondent's own educational level, which was strongly associated with both early parenthood and health. The addition of the variable indicating whether respondents had lived with a partner at the time of the first birth had a smaller effect in the West and

TABLE 5 Odds ratios from sequential logistic regression analysis of associations between early age at entry to parenthood and fair/bad self-rated health

	Women				Men			
	Age at first birth below 20		Age at first birth >one SD below mean		Age at first birth below 23		Age at first birth >one SD below mean	
	West	East	West	East	West	East	West	East
Model 1	1.80***	1.41***	1.81***	1.47***	1.41***	1.39***	1.61***	1.32***
Model 2	1.66**	1.32***	1.68***	1.38***	1.34***	1.36***	1.53***	1.29***
Model 3	1.40**	1.12	1.42***	1.18***	1.17*	1.23***	1.33**	1.17*
Model 4	1.30*	1.11	1.33*	1.16***	1.13	1.23***	1.26**	1.15
N	7,157	14,411	7,157	14,411	6,464	10,729	6,464	10,729

* p<0.05, **p<0.01; ***p<0.001. SD = standard deviation. Tables including confidence intervals are available on request.
NOTES: Model 1 adjusted for age and early age at first birth; Model 2 additionally adjusted for parents' occupation, parents' education, and whether respondent lived with both parents in childhood; Model 3 additionally adjusted for own education and whether living with partner at first birth; Model 4 additionally adjusted for ever divorced, non–white collar occupation, and whether currently married. All models include country fixed effects and dead child indicator.

virtually none in the East. In the final model early motherhood, measured in either relative or absolute terms, remained associated with self-rated health in the West. In the East only motherhood at a young age relative to the country and cohort mean remained positively associated with poor health. Effects of early fatherhood were smaller and, although the direction of the association between early fatherhood and poor health was always positive, associations were not significant in the West using the absolute measure or in the East using the relative measure of early fatherhood. Differences between Model 3 and Model 4 in estimates of the effect of early parenthood on health were non-existent or trivial in the East but larger in the West, particularly for women, indicating a differing impact of adding controls for the adult life variables.

For women there were differences between the North East and South East country groups in the extent of association between teenage motherhood and later poor health. Results from analyses for these sub-regions, and for the West, are illustrated in Figure 1. The association between early motherhood, measured in absolute terms, and later self-rated health was largest in the West, intermediate in the North East, and lowest in the South East, where the association was no longer significant once own education was controlled (Model 3). The difference between the West and the South East in the association between teenage motherhood and health was significant, although there were essentially no differences between the two Eastern sub-regions in levels or patterns of association for men. Figure 2 presents comparable information using reported long-standing illness as an alternative indicator of health. For women this shows a similar pattern to

FIGURE 1   Associations (odds ratios, 95% confidence intervals) between early age at parenthood (<20 females, <23 males) and fair/bad self-rated health, in successive models, by region
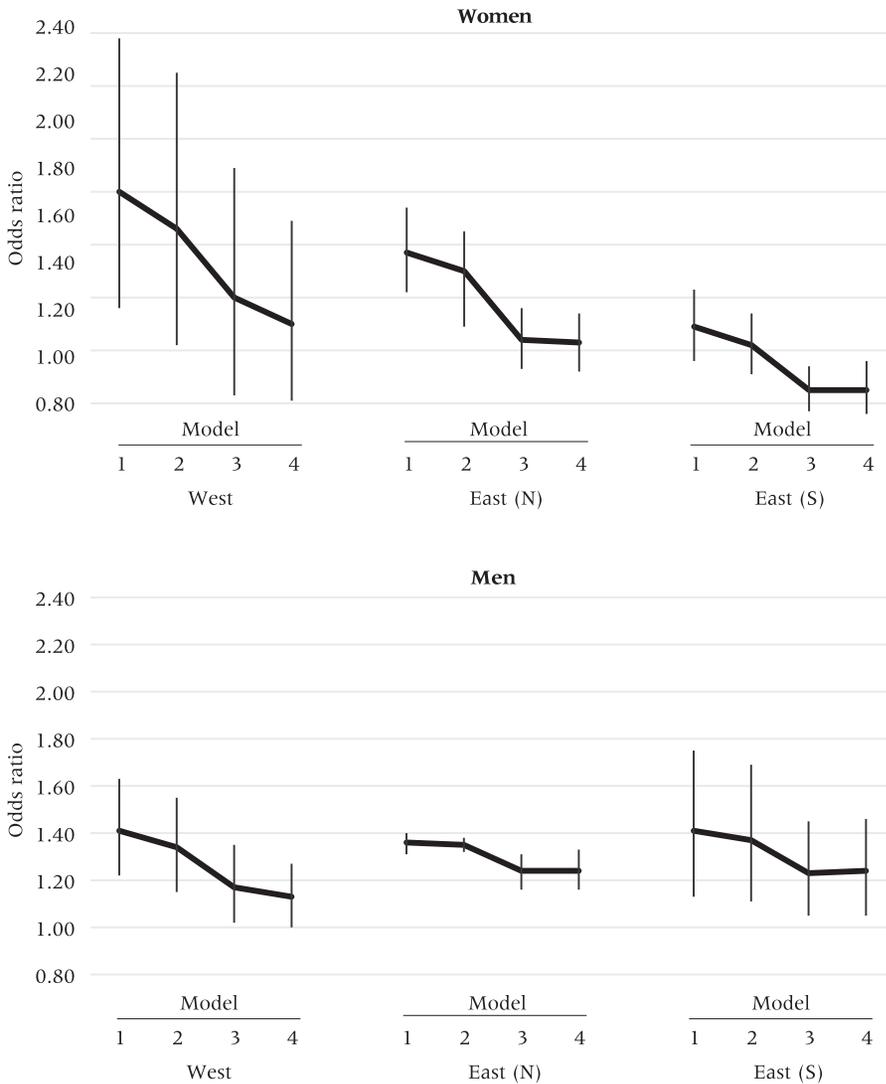
NOTE: For description of models see Table 5.
West: Belgium, France, (W) Germany, Netherlands, Norway; East (N): Lithuania, Poland, Russia; East (S): Bulgaria, Georgia, Romania.

the results for self-rated health, with little modification of associations in successive models in the East compared with the West. These figures clearly illustrate the difference between East and West in the effect of adding controls for adult life variables. In the West these controls modified associations between early parenthood and health, particularly for women, while in the East they had no effect.

FIGURE 2   Associations (odds ratios, 95% confidence intervals) between early age at parenthood (<20 females, <23 males) and reported long-standing illness, in successive models, by region
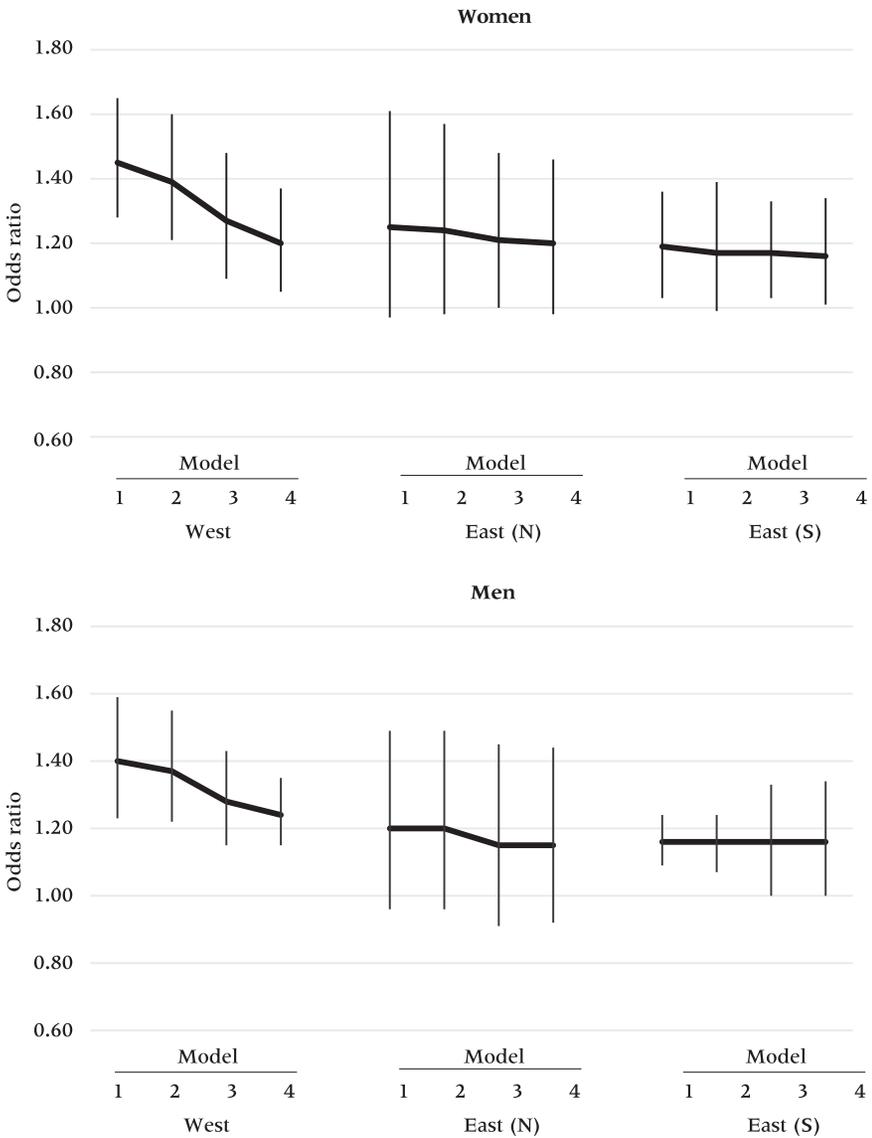
NOTE: For description of models see Table 5.
West: Belgium, France, (W) Germany, Netherlands, Norway; East (N): Lithuania, Poland, Russia; East (S): Bulgaria, Georgia, Romania.

Results from the final fully adjusted model including the absolute indicator of early parenthood are shown in Table 6 for all countries together as well as for West and East. Odds ratios for co-variates from the models including the relative measure of early parenthood were virtually identical (never

TABLE 6 Full results (odds ratios) from logistic regression analysis of associations between early age at entry to parenthood and fair/bad self-rated health

	Women			Men		
	All	West	East	All	West	East
Age at first birth:						
< 20 (female) / < 23 (male)	1.21*	1.30*	1.11	1.20***	1.13	1.23***
Age	1.05***	**1.03***	**1.07***	1.06***	**1.04***	**1.07***
Parents' occupation: Blue collar	1.07*	1.10	1.03	1.03	1.05	0.98
Parents' education: Low	1.18*	1.18*	1.17***	1.09**	1.05	1.13**
Did not live with both parents in childhood	1.26***	1.20	1.27***	0.95	**1.10*	**0.87
Own education: High	0.68***	0.76**	0.60***	0.66***	0.65***	0.64**
Own education: Low	1.37***	1.32***	1.42***	1.29*	1.27***	1.27
Not living with a partner at birth of first child	1.11	**1.41**	**0.98	1.08	1.11	1.10
Has deceased child	1.30**	**1.04	**1.55***	1.23**	1.31**	1.18
Last/current occupation: Non–white collar	1.45**	**1.89**	1.20*	1.43***	**1.87***	1.21*
Ever divorced	1.26*	**1.61***	**0.96	1.03	**1.24**	**0.85
4+ children	0.96	**0.90	**1.12	1.03	1.11	1.01
Not currently married	1.15*	1.04	1.19	1.18***	1.15**	1.17**
N	*21,568*	*7,157*	*14,411*	*17,193*	*6,464*	*10,729*

*p<0.05, **p<0.01; ***p<0.001. Bold indicates significant difference between West and East (p<0.05). Tables including confidence intervals are available on request.
Reference categories: age at first birth 20+ (female)/23+ (male); parents' occupation white collar; parents' education medium/high; lived with both parents for most of childhood; own education medium; lived with partner at birth of first child; no deceased child; last occupation white-collar; never-divorced; < 4 children; currently married. Models include country fixed effects.

differing by more than 0.02) and so are not presented. In the combined data for all regions, early motherhood and early fatherhood were positively associated with poor health, although the effect was not particularly large (odds ratio 1.21 for women; 1.20 for men). Odds ratios using the relative indicator (not shown in table) for the combined sample were similar (1.27 for women; 1.21 for men). As shown in Figure 1, early motherhood in this final model was positively associated with poor self-rated health in the West but not the East (although only the difference between the West and the South East was statistically significant); for men the reverse was the case.

In terms of associations between other variables and health, older age was associated with higher odds of poor health, and the effect was stronger in the East than in the West. Among the childhood circumstance indicators, low parental education was associated with poorer self-rated health for women in the West and East and for men in the East, but the effect was small. In this fully adjusted model, parental occupation was, in most cases, not associated with respondents' own health, and associations between not living with both parents in childhood and health were not significant for

women in the West or men in the East. Level of education was inversely associated with poor health. The effect of having a non–white collar occupation on poor health was stronger in the West than the East. Effects of having experienced divorce also differed between West and East, with an adverse association with health in the former, especially for women, but not the latter. Not being currently married was associated with higher odds of poor health for men but not women. For women, not living with a partner at the time of first birth was associated with poorer health in the West but not the East, and having a child who died was associated with poorer health in the East but not the West.

Discussion

We investigated associations between childhood circumstances and early parenthood; between early parenthood and high parity, last occupation, and experience of divorce; and between early parenthood and later life self-rated health among women and men aged 50–80 in 11 Western and Eastern European countries. East–West comparisons are of particular interest because of longstanding patterns of earlier parenthood in the East and past geographic differences in social and economic factors that may have buffered disadvantages resulting from earlier parenthood. We used two indicators of early parenthood, one based on chronological age and the other a relative measure, to further address the issue of selection. In some analyses we distinguished between two Eastern sub-regions, with South Eastern countries (Georgia, Romania, and Bulgaria) having higher rates of early motherhood than the richer North Eastern countries (Lithuania, Poland, and Russia).

    Our analyses showed that childhood disadvantage, as indicated by low parental education and parental blue collar occupation, was associated with a greater likelihood of becoming a parent at an early age. For men the association was stronger in the West than the East, significantly so in the case of parental occupation. Among women the absence of one biological parent in childhood was also associated with early motherhood; this is consistent with previous findings of associations between fathers' absence and girls' earlier physical maturation, sexual initiation, and motherhood (Belsky, Steinberg, and Draper 1991). These results provide partial support for our hypothesis that adverse selection into early parenthood would be greater in the West than the East.

    East–West differences in associations between early parenthood and adult outcomes that might mediate links with health—high parity, occupational status, and experience of divorce—were sharper. Early parenthood was positively associated with risk of divorce, high parity (for men), and non–white collar occupation to a greater extent in the West than the East; results were similar using the absolute and relative measures of early parenthood. Sequential models of associations between early age at first

birth and self-rated health showed that these intermediate outcomes were relevant in the West but not in the East. In the West, odds of poor self-rated health in models including or excluding these variables differed for women (and to some extent for men), whereas in the East inclusion of these variables had trivial effects. We found similar results in analyses using long-standing illness rather than self-rated health as an outcome. This lends support to our hypothesis that associations between early parenthood, particularly early motherhood, and these intermediate outcomes would be smaller in the East than the West because of greater past state support for families, encouragement of female education and labor force participation, and weaker links between educational attainment and occupational advancement and income during the Soviet era.

Our main research question concerned the association between early parenthood and health in mid or later life. Consistent with our hypothesis that this association would be weaker in the East than the West, we found that the association between giving birth before age 20 for women and self-rated health in later life was greater in the West than the East. The main—and statistically significant—difference was between the Western and the South Eastern countries, where early motherhood was most common and was not associated with poor self-rated health in fully adjusted models; results for the North Eastern countries were intermediate.

Limitations

Various limitations need to be considered in interpreting these findings. The data we used were cross-sectional and the life-course indicators, including timing of the first birth, came from retrospective reports that may be subject to recall bias. In general it may be expected that women remember the date of their first birth, and this has been confirmed in other studies of European populations comparing contemporary and retrospective accounts (Poulain, Riandey, and Firdion 1991), although men's reporting of fertility may be poorer (Rendall et al. 1999). We found that reports of completed fertility generally matched well overall with relevant country data, although less so for Lithuania and more particularly Romania. In the latter case this may reflect underreporting of births of children who were placed in orphanages or died during the "forced births" period in 1967. Other studies have reported good correspondence between recollected childhood circumstances and external sources of information (Havari and Mazzonna 2015), but knowledge and recall of details about parents' occupation and education may be subject to error, and this information was missing for some respondents. Using multiple imputation, we investigated possible bias arising from missing data. In general, models using imputed data provided results similar to complete case analysis, offering reassurance that this was not an important source of bias. Analyses were by definition restricted to those

who survived to be included in the GGS surveys. The early life experiences of members of relevant birth cohorts who died before the survey are highly likely to vary from those of survivors. In general this might be expected to lead to some underestimation of the strength of associations between, for example, childhood circumstances and early parenthood, as non-survival would be greatest among the most disadvantaged. Because early parenthood has been found to be associated with raised mortality risks, there may also be some underestimation of associations between early parenthood and health, especially for groups with higher rates of premature mortality, such as men in the East.

Conclusions

These results partially confirmed our hypotheses that there would be differences between Western and Eastern European countries in the extent of selection into early parenthood and East–West differences in associations between early parenthood and subsequent outcomes, including later life health. The results also suggested, as hypothesized, that some of the association between early parenthood and later health may be mediated by occupational progression and risks of divorce and high parity, but that this association varied between Western and Eastern European countries, being important in the former but not the latter. This observation indicates that structural aspects of social and economic organization are important influences on disadvantages associated with early parenthood and may potentially be modified.

Notes

1 A small number of people who had current positions in the armed forces (ISCO 0) were coded as having white collar occupations.

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