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ORIGINAL PAPER

Future Caregiving Responsibilities, Employment Uncertainties, and Expected Childbearing Behavior: Survey Experimental Evidence from Germany

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Abstract

In societies experiencing declining birth rates, understanding factors that influence childbearing decisions is of interest. We used a factorial survey experiment to investigate how scenarios of future caregiving responsibilities toward aging parents and employment uncertainties shape the expected childbearing behavior of a fictitious couple. Respondents from the nationally representative German Socio-Economic Panel Innovation Sample (SOEP-IS) ($n = 1{,}750$) were randomly assigned to five vignettes, each describing a hypothetical couple with varying levels of caregiving responsibilities towards an aging parent and employment uncertainties. Respondents subsequently rated their expectations about the hypothetical couple's childbearing behavior within the next three years using an 11-point scale. Results show that high caregiving responsibilities and dual employment uncertainties reduce expected childbearing behavior by 2.8 and 1.9 units respectively, compared to when these are absent. The negative effect of high caregiving responsibilities is more pronounced among women, while respondents' own caregiving and employment experiences do not moderate these effects. These results demonstrate how both future-oriented caregiving responsibilities and employment uncertainties alter expectations about family formation and highlight the scenarios that are regarded as more or less favorable for childbearing.

Keywords Caregiving responsibilities · Employment uncertainties · Expected childbearing · Factorial survey experiment · Germany

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Introduction

Families in contemporary societies are confronted with multiple uncertainties and challenges arising from employment instability, caregiving responsibilities, and individual concerns about specific issues (e.g., environmental, geopolitical, etc.). There are strong theoretical arguments suggesting that these future-oriented uncertainties and family responsibilities can lead to fertility postponement and reduced total fertility. Beyond economic and employment-related worries that young adults confront, it is plausible that the compounded emotional and time-related demands of sandwiched caregiving (Lei, et al., 2023) might postpone or deter childbearing. Importantly, these future uncertainties and responsibilities are unlikely to occur in isolation—individuals and families make childbearing decisions not *solely* based on one domain (i.e., employment or health) but on a more holistic assessment of their current and future positions and scenarios.

Existing scholarship suggests that *employment uncertainties*, broadly defined, partly explain fertility dynamics in many Western contexts (Currie et al., 2014; Gatta et al., 2021; Schneider, 2015; van Wijk et al., 2022). However, the direction and significance of these associations are not fully conclusive and depend on whether the analysis focuses on first-birth timing, higher-order births, or fertility intentions (Kreyenfeld, et al., 2023) and whether "uncertainties" are operationalized through unemployment, fixed-term employment, or other alternative indicators (Buh, 2023). Results also differ widely across country contexts: the association between employment uncertainty and fertility is positive in the United States (Schwandt & von Wachter, 2019), ambiguous in Germany (Hofmann & Hohmeyer, 2016), and negative in South Korea (Choi et al., 2020). Finally, the literature has also pointed to heterogeneity across population subgroups, showing that the direction and strength of the uncertainty-fertility nexus varies, for example, according to age, gender, and educational attainment (Brauner-Otto & Geist, 2018; Kreyenfeld, 2015).

Previous research on the role of employment-related uncertainties has mostly focused on *past* or *current* individual experiences including involuntary job loss, graduation during a recession, or certain forms of employment arrangements (e.g., fixed-term contracts; Auer & Danzer, 2016; Kreyenfeld, 2010; Schmitt, 2012). However, these operationalizations of uncertainties do not fully capture future-oriented narratives and scenarios that may shape fertility behavior and intentions. Staying close to the understanding of *uncertainty* in common parlance, Vignoli et al. (2020a) argue that narratives and perceptions of the *future* are important yet relatively understudied determinants of fertility behavior and intentions. This framework has been tested empirically in subsequent work. Lappegard et al. (2022) find that a positively portrayed future macroeconomic situation has a positive effect on present fertility intentions of couple respondents. Further, Guetto et al. (2023) demonstrate that negative news about the economy are negatively associated with fertility behavior, suggesting that the media plays a role in shaping individual perceptions of the future and, consequently, fertility behavior.

A substantive contribution of the current study is recognizing that alongside economic uncertainties, caregiving responsibilities towards an aging parent may shape childbearing decisions. Older adult care responsibilities are especially relevant in

societies with later ages at childbearing, such as Germany, with an increasing share of "sandwiched" caregivers (Alburez-Gutierrez et al., 2021) who have dual care responsibilities both towards aging parents and young children. These compounded demands are associated with experiencing more financial and emotional difficulties (Lei, et al., 2023). This phenomenon is relevant as recent demographic trends not only show a decline in birth rates in Europe but also that women and men are postponing first births, potentially resulting in overlapping periods of child and older adult care (Lazzari, et al., 2024; Roustaei, et al., 2019). This scenario can pose challenges for individuals and families in terms of time, material resources, and mental and emotional capacities to fulfill caregiving responsibilities. The idea of having competing caregiving responsibilities may affect family formation as couples seek to avoid compounding the cognitive, emotional, and physical strains of care work. Conversely, it may also be the case that when one takes care of aging parents, one becomes more aware of one's own frailty and the possibility that the welfare state does not fully cover this risk. Hence, the family bears a significant part of the responsibility. Against this background, it is also possible that caregiving responsibilities even increase the desire for children. To date, however, there has been little empirical research on the effects of present and future old-age caregiving responsibilities on fertility intentions and behavior.

Our study focuses on the German context, which is experiencing both persistent increases in the share of older adults in the population and delays in (first) childbearing ages. As of 2022, the average ages at first birth are 30 and 33 for women and men, respectively (DESTATIS, 2023). Although healthy life expectancy in Germany has generally risen to a similar extent as in other countries (EUROSTAT, 2023), the postponement of childbearing has increased the risk of people having to care for their minor children and their aging parents in close succession or even at the same time, placing an increased care burden particularly on women (Schäper, et al., 2023).

Substantively recognizing both employment and caregiving-related future scenarios that influence childbearing decisions (Brauner-Otto & Geist, 2018; Gatta et al., 2021; Vignoli et al., 2020b), this paper methodologically advances the literature by using a survey experiment. We build on the growing body of experimental work in this area, in particular studies that drew on the "narrative framework" to examine how economic uncertainty influences fertility (Karabchuk, et al., 2022; Lappegard, et al., 2022; Guetto et al., 2025; Vignoli, et al., 2022). We extend this research by designing a factorial survey experiment that not only examines economic uncertainty but also the effects of caregiving responsibilities on fertility. In this experiment, respondents were randomly assigned vignettes—various hypothetical situational contexts and constraints—where they were prompted to assess whether they expect the couple to have children. The advantages of using an experimental design to address our research questions are threefold. First, through random assignment of hypothetical vignettes, we reduced confounding by unobservable factors as respondents had an equal chance of receiving a particular vignette (Auspurg & Hinz, 2014; Sauer, et al., 2020). Second, survey experiments provide an opportunity to explore topics that might be deemed sensitive by some (including own childbearing behavior) and scenarios that may not be ethically or practically feasible to observe in real-world set-

tings. Finally, experimental designs address the common issues in making causal claims using observational data, such as unobserved confounding.

This experiment was fielded in the national representative German Socio-Economic Panel Innovation Sample (SOEP-IS), a subsample from the main SOEP respondent pool intended for the implementation of one-off surveys and experiments. Each respondent received five randomly selected vignettes that varied the future employment situation of a fictitious heterosexual couple as well as the female partner's caregiving responsibilities. Our focus on women's caregiving duties is motivated by persistent gender inequalities, with women still devoting twice as much time for care activities as men do (Schäper, et al., 2023; Destatis, 2024). Respondents were then asked to rate the likelihood of the couple having a child in the next three years under these constraints. It is important to note that the outcome does not measure the respondents' *own* fertility preferences but rather the expected childbearing behavior of the hypothetical couple in the vignette, as evaluated by the respondents. Hence, this study design allowed us to investigate respondents' perceptions about the enabling contextual conditions for childbearing rather than their own actual fertility behavior. Therefore, we refer to this outcome as *expected childbearing behavior* (or expected childbearing).

Background

We build on three streams within the expansive literature of the "uncertainty-fertility nexus"—(a) the role of employment uncertainties and caregiving responsibilities in childbearing decisions; (b) the use of experimental approaches in studying the enabling conditions of parenthood; and (c) heterogeneities across population subgroups. In this section, we briefly summarize the most salient findings and recent developments in each strand and subsequently highlight our main contributions.

Employment Uncertainties and Caregiving Responsibilities

Although "uncertainty" typically denotes imperfect, unknown, or imprecise information about the future, the fertility literature has interpreted and operationalized this term quite broadly. In many cross-country studies, "economic uncertainty" has been defined using objective macroeconomic markers such as unemployment rates and GDP growth. In the United States and in Latin America, spikes in unemployment are associated with fertility declines (Adsera & Menendez, 2011; Currie et al., 2014; Schneider, 2015). Subsequent macro-level papers have operationalized uncertainty beyond these objective markers, instead using Google trends (Comolli & Vignoli, 2021) and (traditional) media coverage (Guetto et al., 2023) to remain close to the understanding of "uncertainty" in common parlance and found these measures negatively associated with fertility rates.

At the individual level, employment uncertainty has been operationalized using objective markers of instability such as unemployment (Kreyenfeld & Andersson, 2014; Pailhé & Solaz, 2012) and fixed-term contracts (Schmitt, 2012; Vignoli et al., 2020b). While unemployment is a straightforward measure of joblessness, fixed-term

contracts also represent uncertainty as workers are unsure about their future occupational positions and income streams. These papers generally find that spells of unemployment and fixed-term employment are associated with first birth postponement in Germany and Denmark (Kreyenfeld & Andersson, 2014; Schmitt, 2012) and France and Italy (Pailhé & Solaz, 2012, Vignoli, et al., 2020b). In a meta-analysis of European fertility papers that used objective markers of unstable employment, Alderotti et al. (2021) showed there are mixed results depending on how employment instability is operationalized (unemployment vs. fixed-term employment), which country context is studied, and which specific subgroups are affected. By and large, fixed-term employment is negatively associated with fertility for both men and women, whereas unemployment seems to matter more for men than women (Alderotti et al., 2021). A few studies have used more direct measures of uncertainty capturing respondents' subjective worries about their jobs or about the general state of the economy (Kreyenfeld, 2010; Berrington, et al., 2024). Results have been mixed, with some finding a negative (or postponement) effect on fertility (Brauner-Otto & Geist, 2018; Hofmann & Hohmeyer, 2013) and others an acceleration for certain subgroups such as women with lower levels of education (Kreyenfeld, 2015).

Beyond economic considerations, other personal non-economic factors are arguably relevant determinants of childbearing decisions. We contend that one overlooked factor in the fertility literature is caregiving responsibilities towards aging parents, an increasingly common occurrence in ageing societies that is disproportionately shouldered by women. In the United States from 2003 to 2012, 8.9% of 25–44 year-old women were "sandwiched" caregivers who simultaneously provided care for both a parent or an in-law and a child, compared to 6.5% of men in this age group (Suh, 2016). Meanwhile in Germany, around 6% reported to have dual older adult and childcare duties based on estimates from the SOEP from 2010 to 2020—5% for men and 7% for women (Schäper, et al., 2023). This is still a relatively small share. However, with the steady increase in childbearing ages, this is anticipated to grow.

These persistent gendered patterns necessitate a closer look at women's caregiving responsibilities since, in Germany, they still perform as much as double the care work than men do (Schäper, et al., 2023). Given that sandwiched caregivers experience worse health outcomes, higher care burden, and more career interruptions (Alburez-Gutierrez et al., 2021), women who anticipate that they will need to care for an aging parent might be more likely to forgo childbearing to avert compounded caregiving duties. Evidence from Australia and Japan support this conjecture—being a parental caregiver reduces expected childbearing by 7% in Australia (Lazzari & Zurla, 2024), while couples who are expected to look after aging parents are more likely to remain childless (Sakata & McKenzie, 2022).

Recognizing that both future employment and caregiving scenarios are relevant determinants of childbearing decisions, our paper's contribution is to analyze *both* of their impacts on expected childbearing. In doing so, we operationalize "employment uncertainties" as being worried about job loss, consistent with its subjective operationalization in prior work (Kreyenfeld, 2010), while caregiving responsibilities are characterized as different levels of caregiving intensity carried out by women. Importantly, we analyze how the *simultaneous* presence of these job-related worries and caregiving responsibilities further constricts expected childbearing behavior.

Experimental Analyses of the Enabling Conditions of Parenthood

Most prior research on fertility decisions (including behavior and intentions) has relied on observational data whereby potential confounding variables are conditioned on (or "controlled for") in a regression framework. One strand of studies focuses on how fertility is influenced by past (e.g., initial labor market conditions or employment characteristics post-education) or present labor market (e.g., unemployment) experiences (Auer & Danzer, 2016; Choi et al., 2020; Hofmann & Hohmeyer, 2016; Ramos, 2024; Raymo & Shibata, 2017). Another strand of the literature examines how subjective measures of uncertainties, operationalized over instruments such as "How worried are you about your own economic situation?" influence fertility decisions. This type of question, as it appears in the SOEP, focuses on present-time concerns and at best only partly captures perceptions of the future (Vignoli, et al., 2020a, 2020b). In other words, responses to these survey items potentially conflate present-time and future-oriented worries. As it relates to fertility, Hofmann and Hohmeyer (2013) leverage on an exogenous variation arising from a labor market reform in Germany and find that *perceived* economic uncertainty (worries about the financial situation) matters for fertility more for women than men, especially among women in certain types of couple constellations—middle income, male breadwinner, and parents.

Given that there are inherent limitations of causally interpreting estimates from observational data due to possible selection and response quality bias (Winship & Morgan, 1999), recent studies have turned to employing quasi-experimental methods such as difference-in-differences (DiD) and matching and weighting (Comolli & Vignoli, 2021; Hofmann et al., 2017; Ramos, 2024). These papers explore inter- or intra-cohort differences (e.g., fixed-term vs. permanent, recession vs. non-recession entrants) in subsequent fertility outcomes (Ramos, 2024; Vignoli, et al., 2020b, Auer & Danzer, 2016). However, these methods may still not fully address selection bias if, for example, there remain substantial residual differences between the treatment and control groups after matching on pre-treatment variables or in the case of difference-in-differences (DiD) designs, when the parallel trends assumption is barely or not at all met.

Experimental approaches, particularly factorial survey experiments, have been increasingly used to study actual and expected childbearing behavior. Assuming proper randomization, these approaches satisfy the ignorability assumption as the treatment assignment is independent of potential outcomes (Winship & Morgan, 1999). Using the random assignment of vignettes, recent work has analyzed the effects of policy reforms (Guetto, et al., 2025), economic scenarios (Lappegard, et al., 2022; Vignoli, et al., 2022), and income and employment conditions (Karabchuk et al., 2022) on fertility. By and large, these papers confirm prior findings using observational data that people's (negative) economic conditions, both measured objectively and subjectively, deter fertility.

The use of survey experiments in fertility research grows alongside demographers' substantive interest in perceptions or narratives of the future. In a seminal work, Vignoli et al., (2020a, 2020b) developed a *"Narrative Framework"* to argue that fertility decisions are shaped not just by past or current objective conditions

but also by a narrative of the future—one's imagined and perceived future conditions. They argue that narratives of the future are shaped on the one hand by the individuals' social network and their interactions (e.g., peers and family), and on the other hand by external influences and framers of narratives (e.g., media). Recent work has expanded the literature in this direction and empirically tested the effects of perceptions of the future. For instance, Lappegard et al. (2022) used an experimental design to tease out how future economic scenarios affected fertility intentions in Norway, operationalizing positive economic scenarios as a country with higher rates of employment in permanent and full-time contracts and more job opportunities in the next three years. Respondents who were exposed to these positive economic scenarios expressed higher fertility intentions than those exposed to a negative scenario and those not exposed at all (Lappegård et al., 2022).

Taking these methodological advances in the use of survey experiments in fertility research alongside our substantive interest in both caregiving responsibilities and employment uncertainties, we test the following hypotheses:

H1a: Expected childbearing behavior is lower for couples where the female partner's caregiving responsibilities toward an aging parent are high than for those without.

H1b: Expected childbearing behavior is lower for couples with future dual employment uncertainties than for couples without.

Simultaneous Caregiving and Employment Scenarios

Beyond the separate effects of caregiving and employment domains, we also examine whether the effect of future employment uncertainties varies at different levels of future caregiving responsibilities and vice-versa. In other words, do these scenarios interact with each other? While both caregiving responsibilities and economic uncertainties individually tend to suppress expected childbearing, their combined presence creates an exceptional level of vulnerability. Individuals who are burdened by both care obligations and economic instability face heightened constraints (Lei, et al., 2023), which may severely reduce or altogether eliminate their expected childbearing. In other words, while employment uncertainties may per se negatively affect fertility, having simultaneous care responsibilities alongside it is likely to amplify these effects. This combination suggests that it is not merely the presence of either factor, but their contiguous occurrence, that leads to a unique and particularly restrictive situation for family behavior. To analyze how simultaneous caregiving and employment scenarios affect expected childbearing behavior, we hypothesize that:

H2: Expected childbearing behavior will be lowest for hypothetical couples who simultaneously experience high future caregiving responsibilities and dual employment uncertainties.

Heterogeneity by Individual Characteristics

One advantage of experimental studies conducted on larger representative surveys is the possibility of examining the moderating role of individuals' personal experiences. This allows researchers to assess how individual differences, such as gender, social

class or exposure to or caregiving responsibilities, shape reactions to hypothetical scenarios and influence decision-making processes.

Gender. We explore whether the effects of caregiving responsibilities and employment uncertainties vary by gender. We expect the negative effect of having future caregiving responsibilities on expected childbearing behavior is stronger for women given that they traditionally shoulder these obligations and thus perceive the cognitive, emotional, and physical demands of caregiving work differently than men do. This is particularly true in Germany where women perform as much as double the caregiving work that men do on average (Schäper, et al., 2023; DESTATIS, 2024). This expectation is likewise supported by the concept of "social distance" whereby one's identity (e.g., being a woman) could amplify (or suppress) certain behaviors and perceptions (Akerlof, 1997). We contend it is plausible that women may better relate to the caregiving scenarios of others and their requisites and implications on day-to-day life. Hence, we test the hypothesis that:

H3a: The negative effect of future caregiving responsibilities on expected childbearing behavior is more pronounced for women compared to men.

Whether the hypothesized negative effect of having employment uncertainties on expected childbearing behavior is more pronounced for men or women respondents is more difficult to form an expectation on. Considering that Germany is a classic example of a "male breadwinner regime" (Kreyenfeld & Andersson, 2014; Schmitt, 2012), there may well be strong societal expectations that economic security of men is more important than that of women when it comes to fertility decisions. If this norm is indeed universal, it may be reasonable to expect that men and women will not evaluate the importance of (different levels) employment uncertainty differently. We thus test the hypothesis that:

H3b: The negative effect of future employment uncertainties on expected childbearing behavior is similar for men and women.

Own caregiving experiences. One might argue that individuals who are socialized or exposed to caregiving duties (e.g., living with an older adult needing care) may more highly value the importance of caregiving responsibilities for childbearing decisions than those who are not exposed. The established concepts of "psychological distance" in psychology (Liberman et al., 2007) and "social distance" in economics (Akerlof, 1997), whereby proximity is positively associated with the magnitude and intensity of reactions and choices, are relevant in forming our hypothesis. One recent application of the psychological distance theory is a vignette experiment in the Netherlands demonstrating how the negative public perception towards child sexual exploitation is significantly more pronounced if it occurs in a socially close context (e.g., United States) compared to a socially distant country (e.g., Thailand; Koning, 2021). In terms of evaluating expected childbearing decisions, an individual who is spatially proximate (e.g., coresident) to someone needing care or psychologically proximate to worrying about needing care themselves, is plausibly more cognizant of the social, emotional, and physical toll of sandwiched caregiving. Consequently, we test the following hypothesis:

H4: The effects of future caregiving responsibilities on expected childbearing behavior are moderated by individual caregiving duties and caregiving worries.

Social class and economic worries. Similarly, economic security might not be universally and equally perceived as a prerequisite to family formation—someone who is in a more advantaged class position (e.g., service class worker) might have stronger perceptions of its importance. For instance, there are pervasive norms in society supporting the notion that having children requires a stable economic basis (Gatta, et al., 2021). These beliefs and norms are likely to vary, for instance, across social class positions and other employment experiences (Buh, 2023). Although present-day demographic research barely addresses the class-fertility nexus (see, however, Albertini 2024; Kreyenfeld, et al., 2023), classical demographic literature has persistently incorporated class differences in earlier analyses of fertility behavior (Malthus, 1998 [1798], pp.6–11). With a strong moral imperative, this strand of research has stipulated that the fertility behavior of the lower social classes is typically less subject to careful rational consideration than that of the higher social classes (Notestein, 1936). This notion was also enshrined in legislation, as in historical Germany, where many German states in the eighteenth and nineteenth centuries excluded people who received poor relief from obtaining a marriage license (Knodel, 1967). Turning the argument around, the belief that having children requires a stable employment career may be a historically deep-rooted 'bourgeois' approach to fertility choice that is not universal across all social classes. The notion that a secure economic base is a prerequisite for having children may be a more "middle-class" one, so respondents from lower social classes may perceive employment responsibilities less often as a barrier to having children than higher social classes (Kreyenfeld, 2015). Social classes are constructed commonly around occupational positions, as in the case of the widely used Erikson-Goldthorpe-Portocarero (EGP) schema (Erikson et al., 1979), which we adopt here.

H5a: The effects of future employment uncertainties on expected childbearing behavior are moderated by social class. In particular, the effects are more pronounced for service-class respondents.

Finally, it could be argued that it is not the objective marker or social class position that matters, but rather individuals' own subjective experiences, perceptions, and worries. These measures better account for how satisfied individuals are about their own employment conditions, regardless of their employment type of class. For instance, someone on a routine-class occupation may not be worried at all about their employment prospects but someone on a service-class job might be worried about, say, their job being prone to automation or outsourcing. Subjective measures of worries capture these nuances and have been shown to also be a predictor of fertility (Kreyenfeld, 2015; Hofmann & Hohmeyer, 2013; Bogusz 2024). Consistent with earlier arguments in the literature that "uncertainty" is more of a bourgeois concern in Germany such that the negative role of economic uncertainties on fertility is more pronounced among economically advantaged non-worried respondents (Kreyenfeld, 2015), we formally test the hypothesis that:

H5b: The effects of future employment uncertainties on expected childbearing behavior are moderated by subjective employment markers. In particular, the effects are more pronounced for those without worries about their job situation.

Data and Methods

The German Socio-Economic Panel (SOEP) is a nationally representative longitudinal survey covering a broad set of demographic, social, and economic variables that has been conducted annually since 1984 in Germany (Goebel, et al., 2019). Within this data infrastructure, the SOEP Innovation Sample (SOEP-IS) is a subsample dedicated to the implementation of experimental and innovative instruments. Factorial survey experiments are used to study judgments or decision-making in complex social situations. A popular approach, and the one we used in this study, is to expose respondents to different "vignettes" (i.e., scenarios) that vary systematically in one or (more typically) several domains of interest (Auspurg & Hinz, 2014). The vignettes used in our survey experiment were pre-tested in late 2021 (Alonso-Perez, et al., 2021) and data were collected in the 2022 round of the SOEP. The main advantage of conducting a survey experiment through the SOEP-IS was that we were able to use standard variables from the SOEP about the respondents' socio-demographic and economic characteristics including gender, age, social class, and subjective economic worries. The survey experiment was conducted with a final sample of 1,750 respondents, resulting in 8,750 person-vignette observations, 8,510 of which received a valid rating. Each of the randomly assigned 16 vignette combinations had at least 500 responses, allowing us to make robust between-group comparisons (Auspurg & Hinz, 2014).

Vignette Design

In this survey experiment, respondents were presented with hypothetical vignettes with varied scenarios of caregiving responsibilities towards an aging parent and employment uncertainties, each comprising four levels as shown in Table 1. For future caregiving responsibilities, the hypothesized negative effect of having parental care needs on expected childbearing behavior might be driven by two channels—one arising from the absence of grandparental support with childcare and another from

Table 1 Vignette dimensions and levels

Dimension A: Future caregiving responsibilities	Dimension B: Future employment uncertainty
High: Lena's mother has become in need of care due to a serious illness and Lena will soon be taking over the care of her mother alone	*Both*: Tom and Lena are worried about losing their job
Some: Lena's mother is in need of care due to a serious illness and Lena will soon take over her mother's care together with her older sister	*Tom (male partner)*: Tom is worried that he might lose his job
Low: Lena's mother has become in need of care due to a serious illness and will soon move to a long-term old-age care facility	*Lena (female partner)*: Lena is worried that she might lose her job
None: Lena's mother is very active and does not require care or assistance in her daily life	*None*: Tom and Lena are not worried about their job situation

anticipating caregiving responsibilities. We limited this confounding in our vignettes by explicitly designing the scenarios to only capture and refer to the female partner's caregiving responsibilities, without any mention of grandparental involvement in childcare. Specifically, the four treatment levels pertained to scenarios where *future caregiving responsibilities* are high, some (where care is shared with another family member), low (where care is partly outsourced to a facility), and none. We note that the implied idea of grandparental support as a "benefit" of having no future caregiving responsibilities did not come up during the pre-testing rounds (Alonso-Perez, et al., 2021). Nevertheless, we cannot rule out a potential overestimation of the effect of caregiving responsibilities towards an aging parent as respondents automatically factor in the absence of childcare support. For *future employment uncertainties*, the four treatment levels were both partners, male partner (Tom) only, female partner (Lena) only, or neither experiences employment uncertainties.

The experiment began with a brief contextualization of a fictitious heterosexual couple, Tom and Lena, who had the following fixed characteristics:

- Tom (age 27/32/37) and Lena (age 25/30/35) have been living together for three years and generally agree that they may have children together;
- Both are currently in stable employment, work full-time, and wish to continue doing so;
- Tom has no siblings and his parents live further away; and
- Lena's older sister and her mother both live close by, while her father died several years ago.

Except for age, all of these characteristics were fixed and included to provide the respondents with additional contextual information about the couple and minimize ambiguities about the employment and family status of both partners. By providing constant contextual information, we ensured that respondents thought about the same situation when judging the vignettes. *Lena's age* was varied across vignettes but the age difference between Tom and Lena was consistently set to 2 years. The decision to include these characteristics was based on a cognitive pre-test where vignettes of various characteristics were tested for clarity and brevity (Alonso-Perez, et al., 2021).

After each vignette, the respondents were asked to evaluate the likelihood of this couple having a child in the next 3 years on a scale from 0 (very unlikely) to 10 (very likely). To eliminate order effects (Sauer, et al., 2020), vignettes were ordered randomly—respondents were presented with 5 random vignettes from a pool of 16 possible combinations and additional analyses in Online Supplement Figure S1 show the robustness of estimates when controlling for vignette order. Table 1 shows the wording of the caregiving and employment situations in the experiment, with the German translation in the survey shown in Online Supplement Table S1.

Measures

Outcome variable. The outcome was the respondent's evaluation of the likelihood that the fictitious couple will have a child within the next three years, rated on a 0–10 scale. As noted earlier, this outcome is a measure of *expected childbearing behavior*:

rather than the respondents' own intentions, that is, our experiment captures their views of what the fictitious couple described in the vignette will do under these constraints. We note that there is no widely accepted characterization of this outcome measure, with some studies using the term "ascribed fertility intentions" in their respective factorial survey experiments on fertility decision-making (see Guetto et al., 2025 and Lappegard et al., 2022, for instance). Although this outcome may not be directly indicative of how respondents would behave in a similar situation, especially among men and women outside childbearing age, our main interest is not fertility per se but rather the enabling conditions and underlying mechanisms that influence the fertility decision-making process. The ability of survey experiments to tease out the effects of situational constraints makes it appealing in studying childbearing decisions. Our experimental design is comparable to factorial survey experiments implemented in Italy (Guetto, et al., 2025) and Norway (Lappegard, et al., 2022), both discussed in the preceding section.

Individual characteristics. In addition to our main vignette parameters of interest *(future caregiving responsibilities, future employment uncertainties,* and *Lena's age*), we included several additional respondents' characteristics in the model. *Age group* was a categorical variable that classifies the respondent as 18–35, 36–50, 51–65, or 66 and older. *Gender* was a binary variable, based on sex at birth, for women (=1) and men (=0). *Marital status* indicated whether a respondent is single, married, divorced or widowed, or others. *Number of children* identified whether the respondent has none, one, two, or three or more children. *Financial worries* classified whether a respondent has major, some, or no worries about their household's financial situation.

We also used specific caregiving and employment markers for our exploratory heterogeneity analyses. *Caregiving needs in the household* denoted whether a person is in a household with an individual in need of care, while *own worries on old age care* specified whether they have major, some, or no worries about requiring care in the future. For respondents' *social class*, we followed Chan and Goldthorpe (2007) and adopted the 3-class version of the Erikson, Goldthorpe, Portocarero scheme, whereby managers and professional salariats were characterized as "relatively advantaged" and routine workers as "relatively disadvantaged" relative to the intermediate classes. *Subjective job worries* were measured with the question *"*How worried are you about your job security?" As the social class and job worries variables are only available for employed respondents, we included an additional "not employed" category in the respective interaction models. Descriptive statistics pertaining to our full analytical sample are shown in Table 2.

Estimation Strategy

Baseline Model. We estimated expected childbearing behavior as a function of both caregiving and employment treatment indicators and additional controls. Using Ordinary Least Squares (OLS) with individual-level clustered standard errors, we estimated a fully adjusted model shown in Eq. (1).

$$Y_{v,i} = \boldsymbol{\beta}_1 \boldsymbol{C}_{\boldsymbol{v},\boldsymbol{i}} + \boldsymbol{\beta}_2 \boldsymbol{E}_{\boldsymbol{v},\boldsymbol{i}} + \boldsymbol{\delta} \boldsymbol{S}_{\boldsymbol{v},\boldsymbol{i}} + \boldsymbol{\gamma} \boldsymbol{I}_{\boldsymbol{v},\boldsymbol{i}} + e_{v,i} \quad (1)$$

Table 2 Descriptive statistics for study variables

Variables	Observations	%
Vignette dimensions and variables		
Future caregiving responsibilities		
High	2,176	24.9
Some	2,210	25.3
Low	2,179	24.9
None	2,185	25.0
Future employment uncertainty		
Both	2,177	24.9
Tom (male partner)	2,181	24.9
Lena (female partner)	2,250	25.7
None	2,142	24.5
Lena's age		
25	2,905	33.2
30	2,760	31.5
35	3,085	35.3
Individual characteristics		
Age Group		
18–35	1,405	16.1
36–50	1,930	22.1
51–65	2,585	29.5
66 and older	2,830	32.3
Gender		
Men	4,315	49.3
Women	4,435	50.7
Marital Status		
Married	5,195	59.4
Single	1,920	21.9
Divorced/Widowed	1,590	18.2
Others/Don't know	45	0.5
Number of children		
None	3,020	34.5
1	1,885	21.5
2	2,865	32.7
3 or more	980	11.2
Household's financial worries		
Major worries	850	9.7
Some worries	3,605	41.2
No worries	3,935	45.0
Don't know	345	3.9
Caregiving needs in the household		
No	7,980	93.7
Yes	535	6.3
Own worries on old age care		
Major worries	1,315	15.0
Some worries	4,795	54.8
No worries	1,850	21.1
Don't know	780	8.9

Table 2 (continued)

Variables	Observations	%
Social class		
Service	2,185	25.0
Intermediate	1,215	13.9
Routine	765	8.7
Not employed	4,585	52.4
Subjective job worries		
Major worries	140	1.7
Some worries	650	7.7
No worries	4,450	52.9
Not employed	3,180	37.8

These statistics are tabulated from observations, not individual respondents. Each respondent assessed 5 vignettes and thus provided 5 observations

where $Y_{v,i}$ refers to respondent i's evaluation of expected childbearing behavior for vignette v. $\boldsymbol{C_{v,i}}$ and $\boldsymbol{E_{v,i}}$ are vectors of the caregiving and employment treatment level dummies. For precision, we controlled for $\boldsymbol{S_{v,i}}$, a vector of indicator variables for other varying characteristics of the vignette (i.e., Lena's age), as well as $\boldsymbol{I_{v,i}}$, a vector of individual characteristics including sex, age group, marital status, number of children, own caregiving experiences, and employment markers. The beta coefficients of the vignette attributes (β_1, β_2)can be interpreted as the Average Marginal Component Effect (AMCE), that is, the causal effect of a specific attribute level, relative to the omitted baseline, averaged over the joint distribution of the remaining attributes (Hainmueller et al., 2014).

Simultaneous Caregiving and Employment Scenarios. Our second hypothesis explored how simultaneous combinations of caregiving responsibilities and employment uncertainties affect expected childbearing behavior. To test this, we estimated a model including a full set of interactions between caregiving and employment scenarios, as specified in model (2). For ease of interpretation, we present predicted probabilities of expected childbearing across the 16 scenario combinations.

$$Y_{v,i} = \beta C_{v,i} \times \boldsymbol{E_{v,i}} + \boldsymbol{\delta S_{v,i}} + \boldsymbol{\gamma I_{v,i}} + e_{v,i} \tag{2}$$

Heterogeneities by Individual Characteristics. The main advantage of conducting this survey experiment on a large and population-representative sample such as the SOEP is that it allowed us to examine the differences of the treatment effects by population subgroups (i.e., Average Component Interaction Effect)—an extension that is more difficult to do in smaller and/or non-random samples (Sauer, et al., 2020; Rohrer & Arslan, 2021). To test our hypotheses on whether respondents' individual caregiving responsibilities and employment markers (i.e., caregiving needs, caregiving worries, social class, and subjective job worries) moderate their vignette assessments, we used four sets of separate interaction models and present figures of the average predicted probabilities of expected childbearing.

Results

Baseline Results

Results in Fig. 1 show that having high caregiving responsibilities reduces expected childbearing behavior by 2.8 points (from 5.8 to 3.0) on a 0–10 scale. This is a sizable effect, roughly corresponding to the full-sample standard deviation of the outcome at 2.6. The intermediate treatment levels, characterized by sharing care responsibilities with a family member ("some") or outsourcing them to an old-age care facility ("low"), have weaker but still significant negative effects on expected childbearing relative to when the female partner does not carry any future caregiving responsibilities towards an aging parent.

Turning to employment-related uncertainties, couples where both partners worry heavily about losing their jobs have lower expected childbearing by 1.9 points relative to couples where both are in stable employment. Results also suggest significantly lower expected childbearing probabilities when future employment uncertainty is experienced by Tom rather than Lena in the vignette ($p < 0.001$). It is notable that the magnitude for "high" future caregiving responsibilities (relative to none) is larger than that of both partners having high future employment uncertainty and this difference is statistically significant ($p < 0.001$).

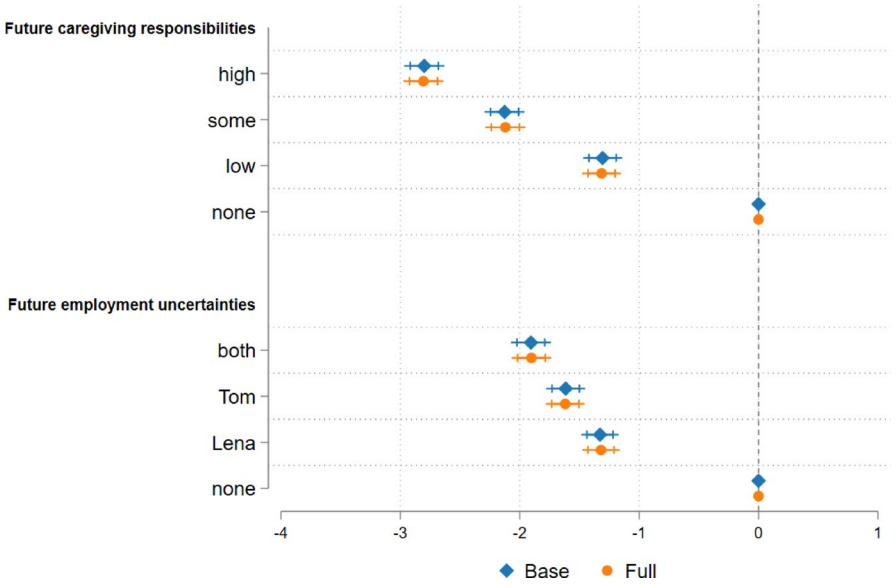


Fig. 1 Treatment effect estimates of caregiving responsibilities and employment uncertainties on expected childbearing behavior *Note:* Coefficients are comparable to the Average Marginal Component Effects (AMCE)—the effect of a change in attribute relative to the base category on fertility. The full model controls for Lena's age and individual characteristics (i.e., age, gender, marital status, number of children, and financial worries). Standard errors are clustered at the individual level. The full model estimates are presented in columns 1 and 2 of Online Supplement Table S2. When controlling for vignette order, results in Online Supplement Figure S1 show virtually no difference in magnitude and direction from these estimates

Indeed, while employment uncertainties are often thought of as preventive for childbearing, these results suggest that other non-economic factors such as caregiving responsibilities towards an aging parent may serve as stronger deterrents. This is understandable given that prior literature has demonstrated how caregivers experience heavy and often highly unpredictable care and emotional burden (Lei, et al., 2023). People in this situation might often feel overwhelmed and less capable of taking on additional family responsibilities related to having children. However, we interpret this to between-attribute differences in magnitude between caregiving and employment only with respect to the specific scenarios in our vignettes.

Simultaneous Caregiving and Employment Scenarios

In Fig. 2, we present predicted probabilities from the fully adjusted interaction model and show that the lowest expected childbearing behaviors are indeed observed for hypothetical couples with future dual employment uncertainties and high caregiving responsibilities. An omnibus F-test confirms that the interaction terms are jointly significant ($p<0.001$). Meanwhile, expected childbearing is highest for scenarios without employment uncertainties and caregiving responsibilities. The difference between these two combinations is stark—around 5 units on an 11-point scale. Notably, the vignette combining high caregiving responsibilities with no employ-

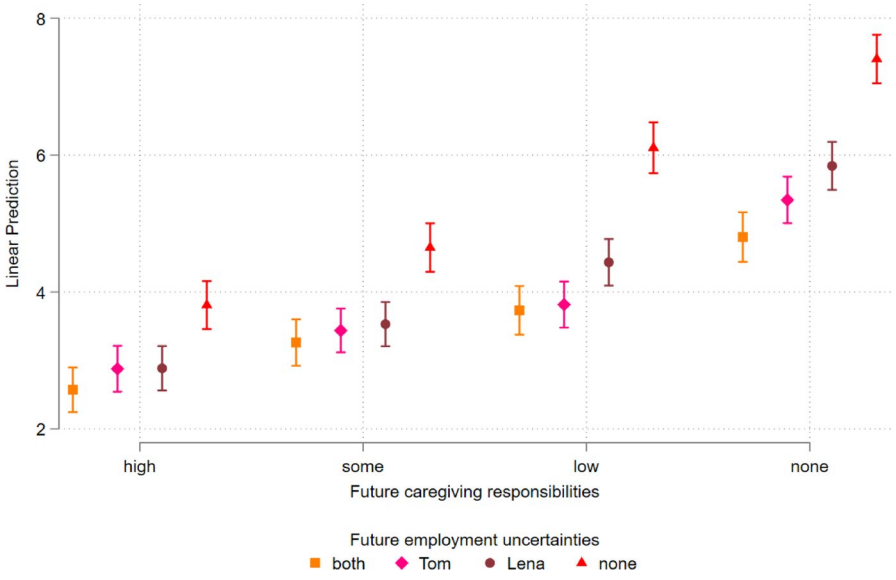


Fig. 2 Predicted probabilities of expected childbearing behavior across simultaneous future caregiving responsibilities and employment uncertainties. *Note:* These models show the predicted probabilities of expected childbearing behavior across simultaneous future caregiving responsibilities and employment uncertainties. These estimates control for Lena's age and individual characteristics (i.e., age, gender, marital status, number of children, and financial worries). Standard errors are clustered at the individual level and Bonferroni-corrected. Coefficients are the model-adjusted probabilities for each combination of caregiving and employment levels. The full model estimates are presented in Online Supplement Table S3

ment uncertainties report lower average expected childbearing (3.81) compared to the vignette without caregiving responsibilities and dual employment uncertainties (4.80), suggesting the stronger relative importance of caregiving over employment ($p < 0.001$). Taking these results together suggest that the presence of simultaneous economic uncertainties and caregiving responsibilities is where expected childbearing is lowest, consistent with our second hypothesis. These substantive results are robust to more parsimonious descriptive evaluations. In Online Supplement Figure S2, we present the unadjusted means for each of the 16 vignette combinations and find similar results—the lowest expected childbearing score occurs for the high care-dual employment uncertainties combination.

Heterogeneities by Individual Characteristics.

Gender. Figure 3 presents our treatment effect estimates for men and women subsamples. Consistent with our expectation in Hypothesis 3a, the negative effect of having high future caregiving responsibilities is more pronounced among women than men. Indeed, as women have traditionally disproportionately shouldered caregiving responsibilities, they might have a different and potentially more accurate understanding of the cognitive, emotional, and physical demands entailed by caring for both an aging parent and a young child. This gendered effect could imply that caregiving responsibilities of young adults towards older parents are more of a barrier for childbearing for women than men.

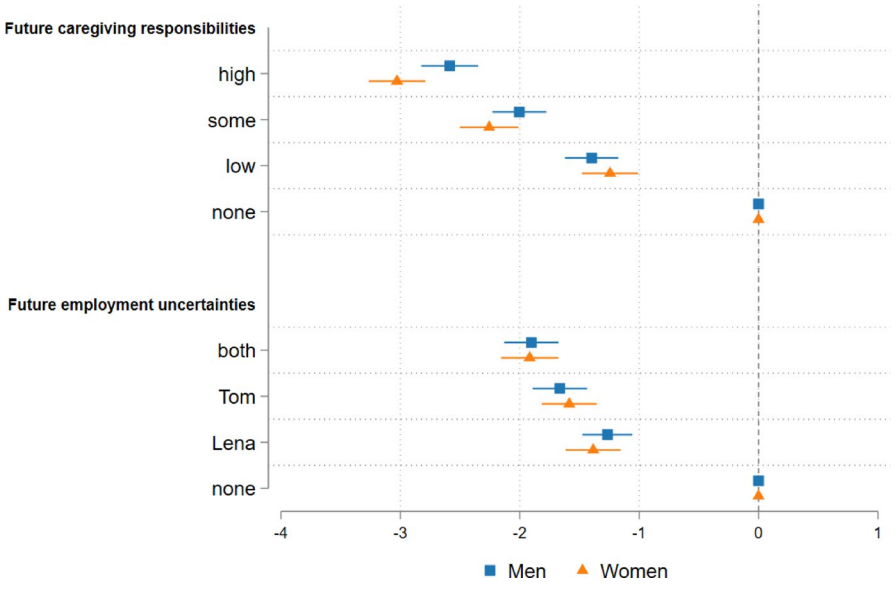


Fig. 3 Treatment effect estimates by gender. *Note:* These models show the predictive margins of the interaction between the respondent's gender and future caregiving responsibilities and employment uncertainty, respectively. These estimates control for Lena's age and other individual characteristics (i.e., age, marital status, number of children, and financial worries). Standard errors are clustered at the individual level. The full model estimates are presented in columns 3 and 4 of Online Supplement Table S2

We do not find any gendered difference in the negative effect of high employment uncertainties on expected childbearing, or any of the other employment treatment levels. Thus, consistent with Hypothesis 3b, men do not seem to attach greater importance to employment stability than women and vice-versa.

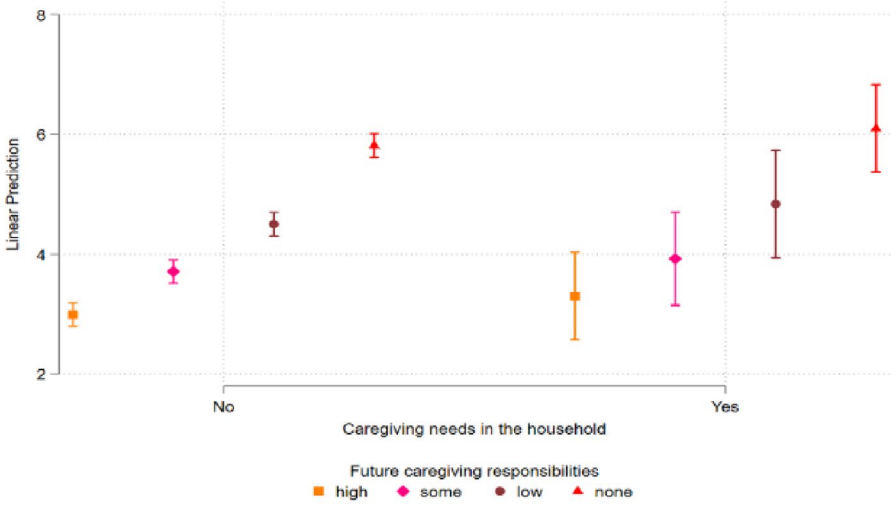
Own caregiving experience. For whether respondents' caregiving duties and worries moderate expected childbearing behaviors, we first interacted the caregiving treatment with an indicator of whether there is someone in the same household requiring care due to old age. Figure 4 shows that the presence of someone requiring care in the respondents' household does not moderate the effect of caregiving responsibilities in the vignette contrary to our expectation in Hypotheses 4a and 4b. In other words, the model-adjusted probability of expected childbearing for the vignette with high future caregiving responsibilities is not significantly different between respondents with (3.3 units) and without (3.0 units) old age caregiving needs in the household ($p=0.264$).

Social class and economic worries. Finally, results in Fig. 5 show that the effects of future employment uncertainties are *not* significantly moderated by either social class ($p=0.358$) or by subjective job worries ($p=0.190$). The model-adjusted probability of expected childbearing for the vignette with future dual employment uncertainties do not significantly differ across service class (3.6 units), intermediate class (3.5 units), routine class (3.5 units), and non-working respondents (3.6 units). We also do not find heterogeneities in the effect of employment uncertainties across different levels of subjective job worries of the respondents, contrary to our expectations in Hypotheses 5a and 5b.

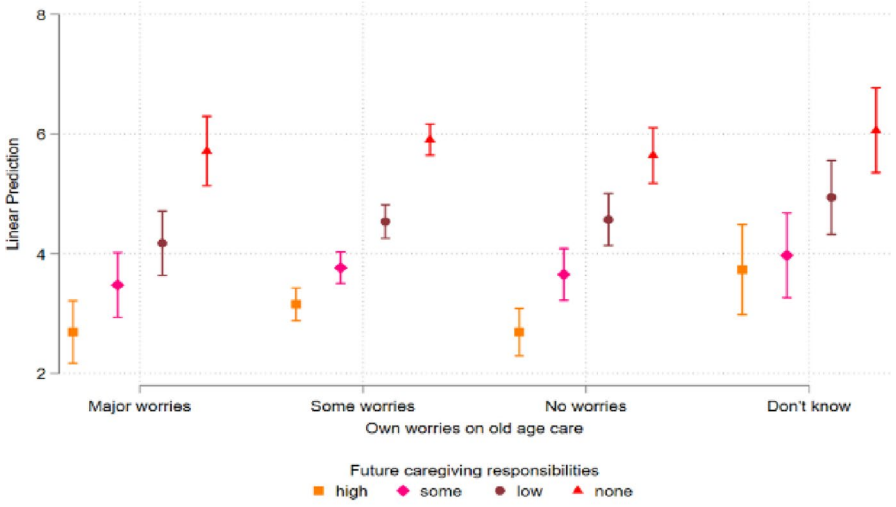
Discussion and Conclusion

In a country with relatively low fertility rates such as Germany, it is important to investigate factors that can deter fertility, which may be reflected by people's views about the enabling conditions for childbearing. Combining the increasing use of experimental approaches in fertility research (Lappegard et al., 2022; Karabchuk et al., 2022; Guetto, et al., 2025; Vignoli, et al., 2022) with our substantive interest on the preventive conditions for expected childbearing, we conducted a factorial survey experiment that presented respondents with varying caregiving and employment scenarios faced by hypothetical couples.

Our contributions are threefold. First, we avoid key limitations of observational designs (i.e., unobserved confounding, limited measures of uncertainty) as our survey experiment randomly assigns respondents to hypothetical scenarios. This allows us to satisfy the ignorability assumption whereby treatment assignment is independent of potential outcomes, being able to estimate causal effects. Second, we extend the literature on the uncertainty-fertility nexus by simultaneously analyzing the effect of employment uncertainties and caregiving responsibilities toward an aging parent, an important but understudied factor shaping fertility. Finally, building on Vignoli, et al. (2020a), our vignettes explicitly framed responsibilities in and uncertainties about the future, thus complementing prior work that has predominantly focused on past

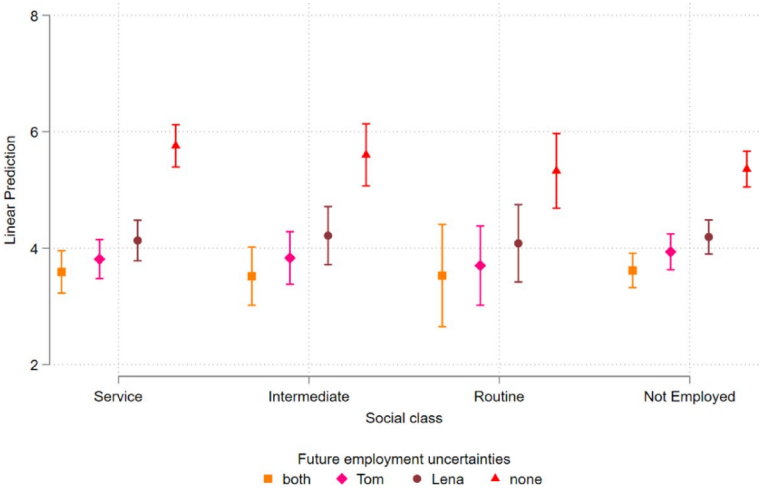


(a) Caregiving needs in the household

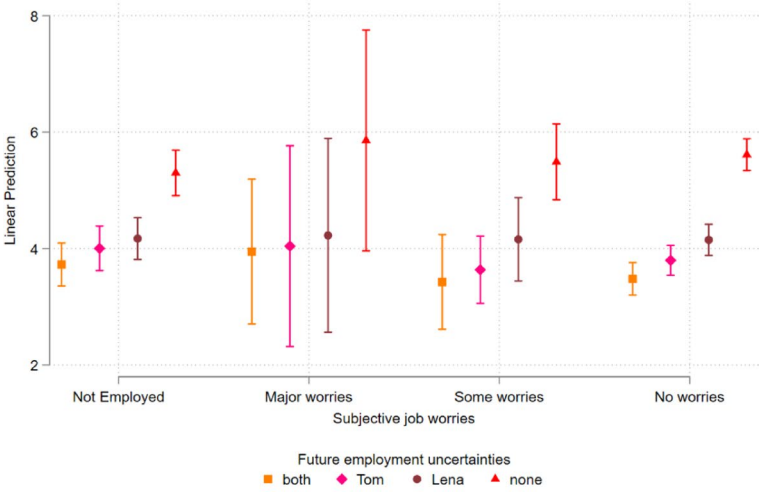


(b) Own worries on old age care

Fig. 4 Effect of future caregiving responsibilities by respondents' own caregiving experiences. *Note:* These models show the predicted probabilities from the interaction between future caregiving responsibilities and two measures (objective and subjective) of respondents' own caregiving experiences,, estimated separately. For old age caregiving needs (n = 8,265), respondents are classified based on the presence of someone in their HH with caregiving needs due to age. This is the closest available variable that captures exposure to caregiving responsibilities. For subjective old age care worries (n = 8,483), respondents are classified based on how worried they are about their own care needs at old age. These estimates control for Lena's age and individual characteristics (i.e., age, gender, marital status, number of children, and financial worries). Standard errors are clustered at the individual level and are Bonferroni-corrected. Results are presented as predictive margins, best interpreted as model-adjusted probabilities for each caregiving treatment level by the respondents' caregiving markers. The full model estimates are presented in Online Supplement Table S4



(a) Social class (EGP schema)



(b) Subjective job worries

Fig. 5 effect of future employment uncertainties by respondents' own employment experiences. *Note:* These models show the predicted probabilities from the interaction between future employment uncertainty and two measures of own employment experiences, estimated separately. For social class (top panel) (n = 8,485), we classify respondents into the three-class EGP schema based on their current occupation, with a "not employed" category to capture non-working respondents (i.e., retired, inactive). For subjective job worries (bottom panel) (n = 8,191), we classify all non-working respondents as "not employed" as they are not asked about their job worries. These estimates control for Lena's age and individual characteristics (i.e., age, gender, marital status, number of children, and financial worries). Standard errors are clustered at the individual level and are Bonferroni-corrected. Results are presented as predictive margins, best interpreted as model-adjusted probabilities for each employment treatment level by the respondents' employment markers. The full model estimates are presented in Online Supplement Table S5

and present experiences (e.g., experiencing a job loss, graduating during a recession, current employment status).

We highlight three notable findings. First, couples with high caregiving responsibilities of the female partner and employment uncertainties for both partners had lower expected childbearing behavior by 2.8 and 1.9 units, respectively (on a 0–10 scale), relative to when these are absent. This finding lends support to prior observational literature on the employment instability-fertility nexus that demonstrates mainly negative associations (Alderotti, et al., 2021; Kreyenfeld & Andersson, 2014; Schmitt, 2012). Gender specific analyses show that the negative effect of having high future caregiving responsibilities was more pronounced among women than men, while the effect of future employment uncertainties did not differ by gender. This suggests that women may have been better able than men to imagine and empathize with what it means to have to take on caregiving responsibilities, consistent with what can be inferred from the psychological distance theory (Liberman et al., 2007). Second, although both attributes showed a statistically significant and sizable effect on expected childbearing, caregiving had a notably larger magnitude than employment. This may be explained by scale differences, but it is also plausible that for some couples the presence of high caregiving duties is a strongly preventive for parenthood transitions.

Third, the effects of caregiving responsibilities and employment uncertainties did not seem to be moderated by the respondents' own caregiving experiences (i.e., presence of care needs in household and own old age care worries), social class position, or own job worries. Respondents indicated the highest expected childbearing for vignettes where neither partner had an uncertain job, regardless of the respondents' own class position and subjective job worries. While recent findings on the uncertainty-fertility nexus suggest fertility differentials by employment markers such as occupational class (Kreyenfeld, et al., 2023), the broader absence of a significant interaction or heterogeneities by employment characteristics may be due to the fact that respondents were evaluating the expected childbearing of the hypothetical couple in the vignettes whose preferences and constraints may be different from their own situation.

We could also interpret this finding to suggest that norms about when it is appropriate to have children and when to postpone parenthood do not vary much by social class and other employment characteristics. In supplemental analyses, we considered several other employment characteristics (e.g., employment status, contract type, occupational class, net monthly earnings) and sample restrictions (i.e., exclusion of non-working respondents). Demonstrating robustness, the results depicted in Online Supplement Figure S3 are qualitatively similar to those in Fig. 5 in that none of these factors had a significant interaction with the employment uncertainty treatment. Taken together, this suggests that respondents asked to make judgments about other people's intentions and behavior may be taking into account the context and environment of the people they are assessing more than their own situation and preferences. Simply put, one's ideas of how other people will behave under a certain set of constraints are less affected by one's own situation. We emphasize that this analysis is descriptive and exploratory—as the covariates of own employment markers are non-randomly assigned, these are mere associations between each marker and the

treatment effect and not the causal effect of moving from one group (e.g., routine class) to another (e.g., service class).

Further probing heterogeneities, it is plausible that apart from gender and the respondents' own caregiving and employment, the respondents' number of children and own fertility intentions might be relevant moderators. Indeed, an individual with positive fertility intentions at the time of the survey might affect their evaluation of how caregiving and employment scenarios matter for childbearing. To demonstrate robustness, we conduct supplementary analyses and results in Online Supplement Figure S4 suggest that there seems to be no pronounced sample-specific differences by number of children and fertility intentions.

The main limitation of our analysis is the inability of the survey experiment to capture individual fertility intentions and subsequent behavior, an inherent limitation of vignette designs and survey experiments more broadly. Hainmueller et al. (2015) reassuringly find that their estimates from a survey experiment on support for immigrant naturalization are in line with respondents' actual political preferences and behavior in real-world elections, but it remains an open question if and to what extent this congruence of experimental and real-life outcomes generalizes to other settings. These general concerns about a possible mismatch between survey experimental and real-world behavior necessitates the interpretation of our outcome as expected childbearing behavior. We contend that this outcome remains informative regarding contextual circumstances that are generally regarded as unfavorable to childbearing.

We likewise recognize the limitation that employment and caregiving constellations are much more nuanced in reality and could be far more complex than the four scenarios included in our experiment. For instance, while our caregiving treatment levels varied the female partner's caregiving workload, these could also be shared between the partners. It is also possible that these caregiving responsibilities toward a parent with care needs occur at a much later age in a low-mortality context (e.g., high life expectancy) such as Germany. Future experimental work should therefore further explore these nuances in caregiving and employment arrangements, as well as focus on other outcomes including higher-order births and intentions to remain childless, among others. Other future avenues of inquiry include differentiation between having no caregiving responsibilities and benefitting from caregiving support, analyzing other forms of uncertainty (e.g., environmental, healthcare, etc.), and comparing the relative contributions of past experiences and perceptions of the future on fertility.

Our work speaks to how having competing caregiving responsibilities and high worries about future employment positions may dissuade childbearing decisions. Although further research is needed to investigate the relationship of caregiving responsibilities and actual fertility behavior, a number of societal and policy implications should be considered based on our results and previous literature. First, policies to support families, i.e., parental leave and comprehensive and affordable childcare could cushion concerns related to issues of economic uncertainties and caregiving responsibilities. Flexible work arrangements and paid leave for old age caregiving would better equip families to manage multiple caregiving duties. For those in need of care, affordable and flexible care services tailored to the individual needs of care recipients and their families might reduce the daily burden of care for those involved. Germany introduced an income-related parental leave ("Elternzeit") in 2007. In

2008, it introduced a care leave ("Pflegezeitgesetz") to facilitate work interruption related to old age care. Different from parental leave, care leave is, however, not paid. Our results lend evidence to the idea that policymakers should take into account the compatibility not only of childcare and paid work but also of older adult care and paid work, and that the sandwiched caregivers are the most vulnerable. Our results show that having institutional care facilities that could partly shoulder the caregiving needs of aging parents cushions the negative effect of caregiving responsibilities on expected childbearing. This suggests that the availability of these services could partially or fully augment the caregiving needs of aging parents in need of care can enable couples to realize their childbearing goals. More broadly, social policies aimed at supporting families to meet their fertility goals should take into consideration tangential policy domains (e.g., in older adult care and labor markets) and address possibly highly vulnerable groups that shoulder both older adult care and childcare simultaneously.

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Data availability Data could be accessed from the website of the German Socio-Economic Panel upon approval of a data access application. Replication codes available upon request.

Declarations

Conflict of interest No conflicts of interest.

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