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ORIGINAL PAPER

From parenthood to planet care? The evolution of environmental and climate concerns during family formation

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Abstract

We examine the effect of childbirth on parents' environmental and climate concerns, focusing on potentially dynamic changes in concerns within a time span of 2 years before and up to 10 years after birth. Additionally, we explore the effect of heterogeneities by gender and educational attainment. Using long-running survey data from the German Socio-economic Panel Study (GSOEP, 1984–2020, $N = 108{,}340$) and estimating linear probability models with fixed-effects, we contribute substantially to previous research that has been limited by cross-sectional approaches with mixed or even contradictory results. Contrary to the popular notion that childbirth leads to higher levels of environmentalism based on legacy motives, our results suggest marginal and mostly negative effects of childbirth on environmental and climate concerns, particularly in the first years after birth. Over time, however, these negative effects diminish and turn slightly positive, indicating increased concerns. We found gender differences varying by concern domain and nuances of different effect directions by educational attainment, highlighting the complex nature of the nexus between family formation, gender, and environmentalism. Recent parents' slightly reduced focus on environmental and climate challenges may reflect denial mechanisms during highly stressful times, as they prioritize immediate and novel challenges associated with parenthood, often leading to an increase in less environmentally favorable behaviors.

Keywords Attitudes · Childbirth · Environment · Ideologies · Longitudinal research · Values

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Introduction

Over the last century, significant growth and widespread resource exploitation have led to numerous environmental challenges, including air and water pollution, greenhouse gas emissions, climate change, biodiversity loss, and deforestation. These issues impact current and future generations, necessitating shifts towards more environmentally and climate-friendly practices.

Research indicates that individuals with a strong future orientation and a proclivity to ensure a livable planet for future generations are more likely to adopt environmentally friendly attitudes and support climate policies (Bain et al., 2016; Milfont & Demarque, 2015; Milfont et al., 2012). While early socialization processes often shape these attitudes (Maio et al., 2003), their evolution throughout life, especially during transformative events like childbirth, remains debated (Lersch, 2023). Childbirth is a particularly transformative transition that—according to the Legacy Hypothesis—prompts a shift in individuals' focus toward children's future, influencing parental environmental perspectives (Ekholm & Olofsson, 2017). However, empirical results are mixed, with recent studies based on longitudinal data providing limited support for increased planetary concerns among recent parents (Milfont et al., 2020; Thomas et al., 2018). The present study adds to the growing body of research on the nexus between family dynamics and environmentalism by investigating how childbirth is associated with parents' planetary concerns (i.e., environmental and climate concerns).

Using Germany as a case study, our research advances previous findings in three ways. First, we provide more robust estimates on the link between childbirth and altered planetary concerns through a rigorous analysis of long-term panel data (GSOEP, 1984–2020), focusing on within-individual changes before and after childbirth. This approach yields stronger causal evidence than previous research, which was limited by fewer survey waves and often lacked longitudinal methods to account for time-constant observed and unobserved heterogeneity.

Second, we consider childbirth as an ongoing process rather than a point-in-time event. Due to shorter observation periods, with only a few years observed before and after childbirth, previous research typically considered childbirth as a single point-in-time event, commonly focusing on the average changes shortly after childbirth (Thomas et al., 2018) or in the year preceding it (Milfont et al., 2020). By exploring parents' attitudinal changes over several years before and after childbirth, we offer a more comprehensive understanding of the complex and dynamic interplay between childbirth and planetary concerns.

Finally, we analyze heterogeneity in our association of interest, focusing on gender and educational background. With a sufficiently large sample, we explore gender differences throughout our analyses, acknowledging previous findings on persistent gender differences in unpaid family work (Zoch & Heyne, 2023) and environmental concerns (Blocker & Eckberg, 1997; Milfont et al., 2020; Thomas et al., 2018). This attention to gender enriches our understanding of how parenthood may impact planetary concerns. While education is key to understanding attitudinal disparities in general (Maio et al., 2003) and environmentalism in

particular (e.g., Hornsey et al., 2016; Kvaløy et al., 2012), its association with the link between childbirth and planetary concerns remains underexplored.

Based on those contributions, we address the following research questions: (I) How do environmental and climate concerns change from pre-childbirth up to 10 years after childbirth? (II) How does the association between childbirth and planetary concerns vary along gender and educational attainment? To address those questions, we employ linear probability regression models with individual fixed-effects on longitudinal data from the German Socio-economic Panel (GSOEP, 1984–2020).[1]

Our study contributes to the literature by offering a nuanced, more robust understanding of the relationship between parenthood and planetary concerns, focusing explicitly on attitudes. Germany, as a high-income country with a generous welfare state and comparatively progressive environmental policies, provides a distinctive context where family formation may intersect with environmental attitudes, complementing prior research from New Zealand and the UK. In this study, planetary concerns refer specifically to environmental and climate change concerns, as measured by the GSOEP. While attitudes often reflect underlying values and priorities influencing individual behaviors, our analysis is limited to attitudinal changes without examining shifts in environmental behaviors. However, environmental attitudes play a significant role in shaping engagement and political discourse on environmental issues (Bamberg, 2003; Enzler & Diekmann, 2019; Glasman & Albarracín, 2006) as well as reproductive attitudes and fertility intentions (e.g., Helm et al., 2021). Therefore, our findings aim to determine whether parenthood constitutes a pivotal transition that shapes individuals' planetary concerns across the life course.

Background

Previous empirical evidence

Empirical evidence on the association between parenthood and planetary concerns has been somewhat limited and mixed, largely relying on cross-sectional data and methods. Several of these studies reveal a positive correlation between parenthood and increased environmental concerns (Ekholm & Olofsson, 2017), while others find no significant association (McCright, 2010; Sundblad et al., 2007; Torgler et al., 2008). However, with cross-sectional data and methods, they cannot capture causal effects. A longitudinal approach could more accurately reveal if and how parenthood influences environmental concerns by tracking changes within individuals over time.

More rigorous, albeit somewhat contradictory, evidence emerges from two recent studies utilizing longitudinal data. These studies include various aspects of environmentalism, covering both pro-environmental attitudes and behaviors. Although attitudes and behaviors are distinct phenomena, behaviors can foster the formation

[1] Note that while environmental concerns have been measured yearly since 1984, climate concerns have been surveyed since 2009.

of associated attitudes and values. Thomas et al. (2018), using two waves of data from the UK data with ordinary least squares (OLS) models, demonstrate that having children—first born or higher order—is associated with a modest decline in various pro-environmental attitudes and behaviors. Only first-time parents with high pre-birth environmental concerns showed an increased intent to act more environmentally friendly. In contrast, Milfont et al. (2020), using multilevel interrupted time series models with seven waves of data from New Zealand and approximately 1500 childbirth events, found no significant changes in beliefs about climate change or environmentally conscious behaviors following childbirth.

Although Thomas et al. (2018) and Milfont et al. (2020) currently provide the most robust evidence of null or even small negative associations between childbirth and environmental attitudes and behavior, both studies were limited by data constraints. With a small number of survey waves and observed births, these studies focused on immediate effects, overlooking potential long-term changes post-childbirth. Additionally, only Milfont et al. (2020) examined anticipation effects, limited to the year immediately before childbirth, and found no substantial results. Furthermore, data constraints prevented both studies from fully exploiting the panel structure to account for time-constant observed and unobserved heterogeneity, possibly leading to biased estimates. As such, both studies highlight the need for longitudinal data with sufficient duration and comprehensive longitudinal estimators to uncover potential non-linear, delayed, or anticipated effects.

Theoretical approaches to explaining parents' change in environmentalism

Attitudes, values, and ideologies are foundational constructs in attitudinal research, each distinguished by their level of abstraction and scope. We distinguish between *attitudes* as short-term "tendencies to evaluate an object positively or negatively" (Maio et al., 2003: 284) tied to beliefs about specific situations or objects, and *values* as more abstract, enduring ideals that guide behavior (ibid.). Influenced by individual and situational factors like critical life events, institutions, and cultural norms, these constructs shape perceptions on topics like gender roles, race, and environmental sustainability. Parenthood, as a pivotal life event, may influence intra-individual changes in attitudes (Lersch, 2023), including planetary concerns (Milfont et al., 2020; Thomas et al., 2018).

Historically, research predominantly focused on the legacy hypothesis to examine parenthood's influence on individuals' planetary concerns. This hypothesis posits that having a child can foster positive changes in environmentalism, driven by a legacy motivation, where individuals recognize their behaviors' long-term impact on future generations' well-being. This concept aligns with the generativity theory (Erikson, 1963), suggesting that later life-course episodes tend to prompt individuals to consider their impact on future generations more deeply.

Previous research on environmental issues and the gendered division of labor and social norms suggests that gender plays a crucial role in shaping planetary concerns within the frameworks of the legacy hypothesis and Erikson's generativity theory. Research shows that women generally display greater climate knowledge and

slightly higher concerns about climate change than men, possibly due to socialization and gender norms (McCright, 2010; Sundblad et al., 2007). In the context of parenthood, studies consistently highlight the persistence of gendered roles (Davidson & Freudenburg, 1996) and couples' unequal division of household and caregiving tasks (Zoch & Heyne, 2023), with mothers often carrying a disproportionately larger share of responsibilities. These inequalities suggest that mothers may develop stronger pro-environmental concerns and behaviors due to heightened awareness of risks affecting their child's health and safety (Blocker & Eckberg, 1997), particularly during pregnancy and early caregiving. However, fathers are also presumed to experience shifts in environmentalism, though these changes may be less pronounced due to a greater focus on paid work than care work (e.g., Zoch, 2021), resulting in smaller attitudinal shifts compared to mothers.

Contrasting with theories linking parenthood to heightened environmental concerns, some argue that findings of negative associations or null effects (Milfont et al., 2020; Thomas et al., 2018) reflect shifts towards less environmentally friendly behaviors. Such behavioral changes may, in turn, lead to short-term attitudinal and more enduring value changes, as explained by cognitive dissonance theory (Festinger, 1957) or value change theory (Inglehart, 1990). Parenthood often heightens resource consumption (e.g., for nappies, water, heating), while increased time demands of parenting may leave parents with limited time to engage in environmentally friendly behaviors such as reducing car use or making more sustainable choices. This parenthood-related reduction in pro-environmental behavior—driven by the time and resource demands of caregiving—may clash with pro-environmental attitudes associated with longer-term concerns about the planetary future for children, creating cognitive dissonance (Festinger, 1957). To ease the tension between earlier pro-environmental attitudes and immediate, unchangeable, demands by parenthood that necessitate less sustainable behavior, parents might adopt less environmental-friendly attitudes. This is in line with Inglehart's theory of value change (Inglehart, 1990), according to which the continuous focus on "survival needs" can lead individuals to reorient their more enduring values, reducing the emphasis on self-expression and pro-environmental concerns in favor of stability and practicality. Again, acknowledging the gendered division of childcare and domestic work (Zoch & Heyne, 2023), mothers might face greater constraints on pro-environmental behaviors, likely leading to a stronger decline in planetary concerns than fathers.

Explaining changes in planetary concerns with a dynamic approach

While the legacy hypothesis suggests that parenthood fosters pro-environmental concerns through a long-term generational perspective, other perspectives—such as time availability and increased resource consumption—highlight the immediate constraints of parenthood, which may lead to a decline in pro-environmental behaviors. In contrast, the life course approach (Bernardi et al., 2019) conceptualizes childbirth as a pivotal event shaping attitudes and behaviors over subsequent years before and after childbirth. This perspective emphasizes the need to examine dynamic shifts in parents' planetary concerns, addressing a significant research gap noted by Thomas

et al. (2018) and Milfont et al. (2020). Thus, applying the life course framework, it is essential to consider how the mechanisms linking childbearing and environmental attitudes may differ at different stages of the childbirth "process" (i.e., in anticipation of parenthood, pregnancy, and childbirth, immediately around and after childbirth, and in the years after childbirth). The approach allows us to distinguish between immediate short-term shifts in attitudes and more enduring value transformation over time.

Starting with a theoretical consideration of how environmentalism may change before childbirth, legacy motives suggest that anticipating parenthood may encourage a shift from generational to intergenerational environmental concerns. During pregnancy, expecting parents—and especially mothers—typically gain a heightened awareness of planetary issues as they learn about behavioral and external risk factors that could affect the unborn or newborn child, such as exposure to chemicals in plastic or air pollution (Mello & Hovick, 2016) Such raised awareness potentially fosters increases in planetary concerns. Due to the direct influence that women's behaviors have on the unborn child, it is likely that women's planetary concerns will increase more than men's before childbirth.

The increase in environmental concerns prior to childbirth may, however, be challenged in the immediate months following childbirth. With the arrival of the child, parents' behaviors are altered and new routines need to be established as they face significant time pressures and heightened consumption needs. These changes are likely to challenge parents' ability to maintain consistent pro-environmental actions and attitudes, which may lead to cognitive dissonance (Festinger, 1957). In order to reduce this dissonance, parents may justify less sustainable behaviors that diverge from previous pro-environmental attitudes and behavior, leading to short-term changes towards less pro-environmental attitudes. Again, cognitive dissonance may be stronger for mothers than for fathers, as women generally bear larger shares of childcare responsibilities, take longer career breaks, and face greater adjustments in their daily routines—all of which can amplify their financial and psychological stress more than for men. As a result, women might experience stronger short-term changes towards less environmentally friendly attitudes.

Over time, however, the birth of a child might not only lead to short-term attitudinal changes but also trigger a more persistent evolution of rather stable environmentalist values, shifting between materialist and post-materialist values. On the one hand, given altered attitudes and ideologies, parents may adopt more materialist values, emphasizing the immediate safety and security of their child and family rather than longer-term planetary concerns. This expectation aligns with Inglehart's theory of value change, suggesting that under conditions of pressure, individuals prioritize "survival needs" such as financial stability and the health and well-being of their family over self-expression, including pro-environmental values (Inglehart, 1990). Accordingly, concerns about immediate family needs might be more pressing for parents than broader environmental concerns, leading them to further deprioritize environmental ideals and concerns over time.

However, as children grow older, parents may experience a renewed opportunity to engage in pro-environmental attitudes and shift back to post-materialist values. This shift can be driven by decreased resource consumption, as the need for

specialized disposable or short-term-use baby products diminishes and the reuse of items becomes more feasible. Additionally, parents may also place greater emphasis on teaching their older children environmentally conscious behaviors, such as recycling and conserving energy or water, thus reinforcing environmentalism within the household. Concurrently, parents, particularly mothers, may find themselves with more time and stability to engage in environmentally friendly practices, further fostering a focus on post-materialist values and increasing environmental and climate concerns as the child matures.

In summary, environmental and climate concerns are likely to develop dynamically around childbirth (see Fig. 1). While parents may experience increased concerns before childbirth, the immediate pressures and challenges after childbirth may be associated with a temporary decline in planetary concerns. Over time, as these pressures ease and children grow older, concerns may again increase as parents re-engage with pro-environmental attitudes and behavior. In line with the legacy hypothesis, childbirth could increase parents' environmental and climate concerns in the long term. Alternatively, planetary concerns might stabilize on low levels due to ongoing stressors and competing priorities. Further, we presume changes in planetary concerns to be more pronounced for mothers than fathers.

Variation across educational attainment

Education has been identified as a relevant stratifying factor of planetary concerns and pro-environmental behaviors (Blocker & Eckberg, 1997; Hornsey et al., 2016; Kvaløy et al., 2012; Lewis et al., 2019), serving as a crucial proxy for both information and material resources. Based on the premise that knowledge and awareness of planetary challenges are precursors to action, it has been suggested that higher educational attainment facilitates a deeper understanding and critical thinking skills to understand the complex ecological interconnections and the broader impacts of human activities. This knowledge and enhanced understanding enable individuals to make informed decisions and advocate for effective environmental policies. Additionally, education is often correlated with greater economic resources, which enable individuals to prioritize environmental concerns and behaviors (Franzen & Vogl, 2013; Hartmann & Preisendörfer, 2021, 2024). Conversely, individuals with fewer resources may prioritize immediate needs over long-term environmental legacies.

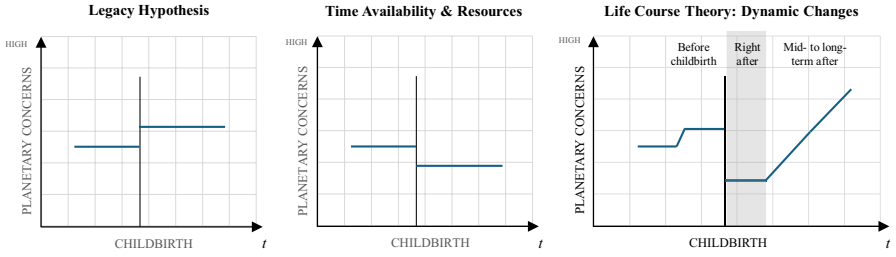

Fig. 1 Theoretical models of how childbirth is linked to planetary concerns

However, higher-income individuals may also contribute to greater resource consumption, though this does not necessarily diminish their planetary concerns; rather, they might justify higher consumption by opting for "greener" products (e.g., organic and fair-trade products, electronic cars). Thus, education encapsulates both the knowledge and material capacities necessary to address environmental challenges.

Educational levels thus likely shape how parenthood influences planetary concerns. However, the direction and strength of dynamic changes are difficult to predict a priori. On the one hand, parents with higher education may generally hold stronger planetary concerns prior to birth because of higher knowledge and awareness, limiting further increases in concerns. Additionally, they generally face less financial stress from family-related career interruptions, so attitudes might remain more stable in the short run but potentially increase further in later years. On the other hand, financial stress associated with parenthood for those with lower resources is likely to divert an individual's focus away from environmental concerns (Enzler & Diekmann, 2019; Szulc-Obłoza & Żurek, 2024). We therefore test empirically, whether the association between parenthood and planetary concerns is more stable among those with higher levels of education. Additionally, we may anticipate educational effects to intersect with gender. Gender differences amongst the higher educated might be small due to generally higher awareness of environmental issues, irrespective of gender. Also, higher-educated men are commonly more involved in childrearing and spend more time with children (Flouri & Buchanan, 2003; Guryan et al., 2008), potentially heightening their planetary concerns. Again, we test empirically whether gender disparities in the effect of childbirth on planetary concerns are less pronounced for highly educated parents.

The German context

Germany's environmental policies and public attitudes have evolved significantly. In West Germany, the 1970s saw a surge in environmental awareness, driven by concerns over pollution, nuclear energy, and emissions, which led to grassroots movements and the founding of the Green Party in 1980. By contrast, East Germany's industrialization led to extensive environmental damage, only widely recognized after reunification (Hartmann & Preisendörfer, 2021; Uekötter, 2017). Post-reunification, East Germany adopted West Germany's policies, narrowing some disparities but leaving differences in regional labor markets, childcare, maternal employment, and attitudes toward politics, gender roles, and the environment (Blien et al., 2016; Hartmann & Preisendörfer, 2021; Zoch, 2021). These disparities are reflected in voting patterns, with the Green Party and Social Democrats typically being stronger in West Germany.

In addition to remarkable policy changes, climate and environmental concerns have varied substantially over time in Germany. The 2000s marked a decisive shift toward sustainability, driven by a coalition government of social democrats and the Green Party. Germany launched the "Energiewende" policy (Uekötter, 2017), aiming to transition to renewable energy and phase out nuclear power. West Germany

was largely leading the movement with its stronger economic resources and early environmental advocacy, whereas East Germany contributed through significant wind energy development but faced challenges due to its historical reliance on coal. Overall, policies like the "Energiewende" have positioned Germany as a global leader in environmental sustainability (Uekötter, 2017). However, while increased political action together with heightened media coverage might point toward a rising public interest in these matters, Hartmann and Preisendörfer (2021, 2024) found that environmental concerns peaked around 1989 but declined until 2000 before staying relatively stable until around 2015. Recently, environmental concerns have risen again, likely influenced by events like the 2021 Western Europe floods.

Beyond its environmental leadership, Germany's rather generous institutional support for balancing work and family life (Zoch & Heyne, 2023) may empower parents to consider long-term issues like sustainability in addition to immediate family needs after childbirth. Germany's family support system includes family health insurance covering children and non-working spouses at no additional costs, tax benefits for married partners, and a 2007 reform that introduced more generous income-based parental leave benefits (Elterngeld) (Zoch & Heyne, 2023). This offers parents up to 67% of prior income for up to 12 months, with an additional two "use-it-or-lose-it" months for the other parent. Parents also have 3 years of job-protected leave and access to expanded state-subsidized childcare for under- 3-year-old children. These measures provide increased financial stability during the first year post-childbirth, support shorter maternal employment interruptions, and encourage paternal involvement in childcare (Zoch & Hondralis, 2017). Altogether, these policies positively impact family resources, thus potentially influencing parents' environmental attitudes and behavior.

Data and methods

Data and sample

We examined the effect of childbirth on planetary concerns by estimating linear probability regression models with individual fixed-effects (FE) using rich individual-level data from the German Socio-Economic Panel (GSOEP v37, 1984–2020, https://doi.org/10.5684/soep.core.v37eu).[2] The GSOEP is a representative household panel with around 20,000 respondents from 11,000 households (Goebel et al., 2019). As the only panel dataset surveying planetary concerns annually, it uniquely enables a longitudinal and dynamic analysis of changes in environmental and climate concerns in Germany, including in relation to childbirth.

We restricted our sample to all available GSOEP waves measuring environmental (years 1984–2020) and climate (years 2009–2020) concerns (see Supplementary

[2] We decided to refrain from using later waves (v38), which also includes the survey year 2021, to avoid the influence of the COVID-19 pandemic on our results. In 2020, over 80% of the interviews were completed by April.

Table A1 for a detailed overview of the sample selection process). The question on climate concerns has only been included since 2009, while environmental concerns have been surveyed since 1984. We therefore started our sample selection with a restriction to waves 1984 to 2020 and later created a sub-sample for analyzing climate concerns. Further, we drew on private households from all random GSOEP subsamples and associated refreshment subsamples, excluding as the high-income or migrant subsamples.[3] Our sample included married or cohabiting individuals who either experienced childbirth or did not experience this life course transition. Additionally, we excluded observations by individuals without pre- or post-birth information. To compare environmental and climate concerns before and after childbirth, focusing particularly on the short- to medium-term effect of childbirth, we excluded respondents with a child older than 10 years. To ensure that the effects were not driven by somewhat unique family settings (e.g., unintended early or comparatively late births), we further restricted the sample to respondents aged 20 to 50 and excluded parents with a third or higher-order birth. Finally, we restricted our sample to respondents with at least two observations—a necessary requirement for FE models. Based on observations with complete information, the final sample consisted of 108,340 observations (12,198 individuals) with 3746 observed first or second births for the analyses of environmental concerns. For climate concerns, our sample included 39,028 observations (7028 individuals). Supplementary Tables A3–4 additionally provide a descriptive overview, including observations, unique persons, observed childbirth events, and further sample characteristics.

Measures

Our two outcome measures were respondents' concerns regarding "environmental protection" (measured from 1984 to 2020) and "the impacts of climate change" (2009 to 2020). Both items were part of a larger item battery with 10 to 15 substantial topics (depending on the survey wave) with the battery's heading: "How concerned are you about the following issues?". Agreement with the statement was measured using a three-point scale ranging from "not concerned at all" (1) to "very concerned" (3). For each measure, we collapsed the first two categories and recoded the scale into a binary measure, distinguishing "not (very) concerned" (0) from "very concerned" (1).

The key independent variable was a dynamic, categorical indicator of the time relative to childbirth, based on mothers' fertility biographies. Specifically, we operationalized the time of and around childbirth using the following nine categories: [1] 2 years before childbirth, [2] 1 year before childbirth, [3] the year of childbirth, [4] 1 year after childbirth, [5] 2 years after, [6] 3 years after, [7] 4 to 5 years after, [8] 6 to 7 years after, and [9] 8 to 10 years after childbirth. The reference category referred to the time of more than 2 years before childbirth, essentially referring to

[3] We excluded these oversamples as they were designed to overrepresent specific groups, which could introduce distortions when analyzing broader patterns. While these subsamples are valuable for subgroup-specific research, our focus is on trends across the general GSOEP sample.

the time before we expect anticipation effects to take effect. Respondents without childbirth were included in the reference category, which did not contribute to the estimation of the childbirth estimate but played a crucial role in the estimation of other covariates. Overall, the categories map onto the times of and around childbirth as discussed in the background section. The first two categories capture anticipation effects, category 3 reflects the immediate effect in the birth year, and categories 4 to 9 represent short- to long-term post-birth effects. Clustering later years into categories ensured a sufficient cell size across the categories. Given the lower number of observed first births during the panel (see Supplementary Tables A3–4), we combined first and second childbirths. However, robustness checks revealed similar patterns for first-time parents.

All of our models were parsimonious and adjusted only for key time-varying confounders possibly affecting both childbirth and planetary concerns. We included respondents' age (as a set of indicator variables) to account for maturation effects. Similarly, we controlled for changes in family status and living situation, including binary indicators on marriage, cohabitation, living with a garden or in rural settlement structures, and respondents' subjective current health (1 good–5 bad). To account for period effects, we included the annual unemployment rate and time periods (grouped into 5-year periods). We refrained from including further time-varying covariates, such as household income or general worries, as these might capture mechanisms through which childbirth influences planetary concerns, potentially mediating its impact and obscuring its effect. Accordingly, controlling for such changes would lead to over-controlling. Additionally, we examined a number of potential underlying mechanisms in our group-specific analyses, by distinguishing between women and men and respondents with tertiary and non-tertiary education (see Supplementary Table A2 for the coding of variables).

Analytical approach

We examined the effect of childbirth on respondents' environmental and climate concerns by estimating linear probability regressions with individual FE. The FE models account for any observed and unobserved time-constant characteristics by comparing respondents' environmental and climate concerns before and after childbirth, thus estimating intra-individual changes in the course of parenthood. Hence, respondents without childbirth do not contribute to its estimate but still inform the estimation of other time-varying covariates, enhancing model robustness and accounting for broader population trends. To account for the nested structure of respondents in households and repeated childbirth, we clustered standard errors at the individual level.

In line with our theoretical considerations, we implemented a multi-step strategy: First, we explored whether planetary concerns dynamically change around childbirth, estimating FE models using our categorical measure reflecting the time of and around childbirth. This approach, also known as a dummy impact function (Andreß et al., 2013; Dougherty, 2006), provides a fully flexible specification to compare concerns in a given year before and after childbirth with the average concern in all

years 3 or more years before childbirth (i.e., before the 2 years of anticipation). Second, by estimating models separately for women and men, we focused on gender differences and accounted for group-specific influences of our controls. Third, we examined further potential effect heterogeneity in the association between childbirth and planetary concerns, examining differences by educational background. Similar to our gender analyses, we estimated models separately for each category. Fourth, we explored the intersection between gender and education, splitting our education analyses by gender. Finally, to connect our analyses more closely with previous research that considered childbirth a time-in-point event, we examined the average effect of childbirth in FE models using a childbirth indicator variable that differentiated between the pre-childbirth period (coded as 0) and the year of childbirth and years after (coded as 1). This approach, also known as a step impact function, provides the average childbirth effect over time compared to the average concerns prior to childbirth.

Result

Association between childbirth and environmental and climate concerns

The descriptive results in Fig. 2 illustrate a shift in environmental and climate concerns between 1984 and 2020. While the proportion of high environmental concerns (black) decreased over time, particularly from the mid-1980s to the early 2000s, the proportion of middle concerns became the dominant category over time. Similarly, the proportion of no concerns (light gray) also slightly increased but remained smaller compared to the other two categories. Climate concerns, surveyed only in later waves, revealed similar stable patterns, with the majority of respondents stating middle concerns. Hence, our results confirm a rather general trend towards fewer planetary concerns observed both in Germany (Hartmann & Preisendörfer, 2021)

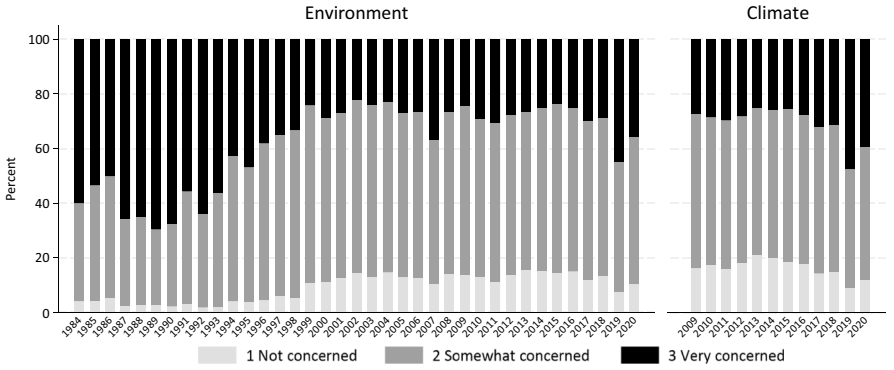

Fig. 2 Distribution of environmental (left panel) and climate concerns (right panel) by year. Note: Unweighted. Source: GSOEP v37 (1984 - 2020)

and internationally (Franzen & Vogl, 2013) but not complete disengagement. Given the rise in the categories of "no" and "middle" concerns, and the relative stability of these categories in the majority of survey waves for both items, we presume that a considerable share of individuals might experience noticeable shifts around childbirth. Seemingly few individuals start from a pre-birth level of strong or no concerns, leaving less room for potential shifts due to a ceiling or saturation effect.

We begin the multivariate analyses by examining how childbirth affects the probability of expressing environmental and climate concerns. Figure 3 presents the results of the effect of childbirth on parents' environmental and climate concerns from FE models with a dummy impact function by plotting the coefficients along with 95% confidence intervals. Anticipation effects are represented by empty markers, while coefficients related to the year of birth and years thereafter are represented by filled markers. Additionally, we illustrate results from the step impact function—that captures childbirth as a one-point-in-time event with a dummy—as underlying line graphs.

We observed slight decreases in the probability of expressing both environmental and climate concerns, before childbirth, during the year of childbirth and shortly afterwards, compared to the reference period of all years up to 2 years before childbirth. However, only the negative anticipatory effect for environmental concerns in the year immediately prior to birth was statistically significant. For both items, the slightly reduced concerns returned to reference levels in later years, although the coefficients were very small and statistically insignificant. Overall, the observed effect sizes between −0.02 and 0.01 correspond to less than 5% of a standard deviation, indicating very small changes.

Focusing on the step-impact function results instead of the dynamic results revealed even smaller and statistically insignificant positive and negative changes in both items, respectively. Conversely, the results from the dummy impact function showed small attitudinal changes over time, particularly in the immediate years around childbirth. Hence, the comparison illustrates that the averaged FE estimator

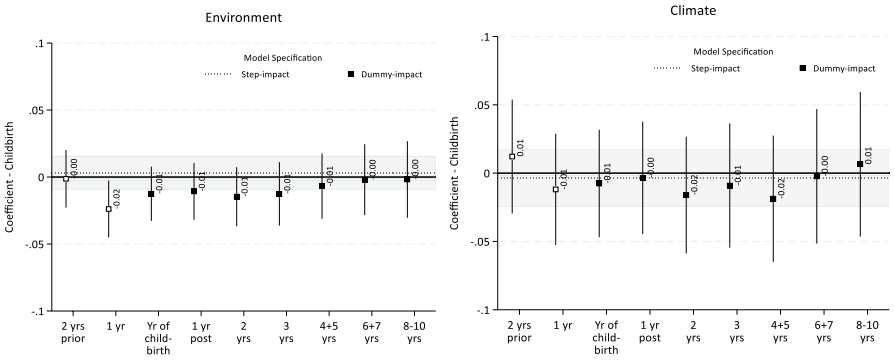

Fig. 3 Childbirth and changes in environmental (left panel) and climate concerns (right panel). Note: Coefficients from separate FE models accounting for age and period effects of individuals. 95% confidence intervals. Empty markers refer to times pre-birth while filled markers refer to times of birth and after. Source: GSOEP v37 (1984 - 2020). Full models in Online Supplementary Table A5

further underestimated the changes in parents' planetary concerns, as attitudinal shifts were somewhat more pronounced in some specific years around childbirth.

Shifting from average effects to gender differences (Fig. 4), we found divergent patterns in altered environmental and climate concerns due to childbirth. Results from the gender-specific models revealed that the overall statistically significant anticipation effect of reduced environmental concerns was driven exclusively by fathers worrying less about environmental protection 2 years before childbirth. Conversely, mothers showed statistically significant increased environmental concerns 2 years prior to childbirth. Moreover, the pattern of fathers' reduced environmental concerns persisted as children grew older, with statistically significant coefficients up to the child's age three, followed by a return to reference levels. For mothers, however, the increased environmental concerns after childbirth were mostly stable, although statistically non-significant. Surprisingly, with regard to climate concerns, the results from the dummy-impact function highlighted reversed gender patterns, with negative coefficients for mothers compared to increased and persistently higher concerns for fathers. The effect sizes for climate concerns were substantially larger than for environmental concerns, though only some of the coefficients directly around childbirth were statistically significant. These differences are potentially due to the shorter observation period and, thus, a smaller sample size. Overall, the item-specific gendered results suggest that mothers and fathers experience distinct priorities and roles during this life stage, shaping their planetary concerns.

The birth of the first child represents a profound life change that is more likely to foster attitudinal changes compared to higher-order births, which may only reinforce existing patterns. As such, we re-examined the effect of first births only but found rather similar patterns compared to our main analyses (Fig. 5). For environmental concerns, effect sizes and statistical significance were comparable to models including first and second births. However, for climate concerns, first births demonstrated more pronounced changes. Women, in particular, showed a strong reduction in concerns, with statistically significant effects in all years following childbirth.

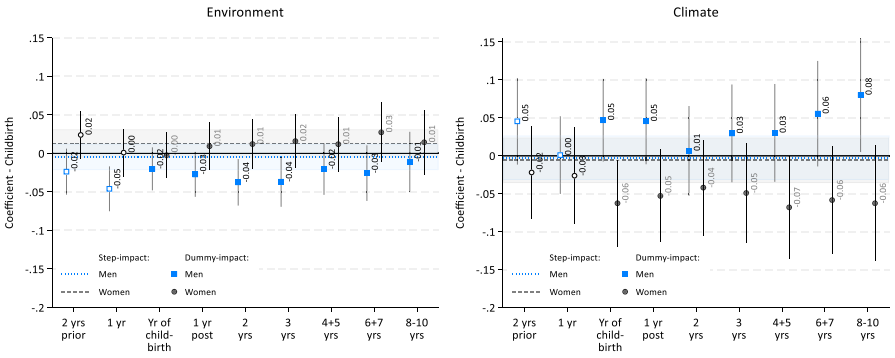

Fig. 4 Childbirth and changes in environmental and climate concerns: gender differences. Note: Coefficients from separate FE models accounting for age and period effects of individuals. 95% confidence intervals. Empty markers refer to times pre-birth while filled markers refer to times of birth and after. Source: GSOEP v37 (1984 - 2020). Full models in Online Supplementary Table A5

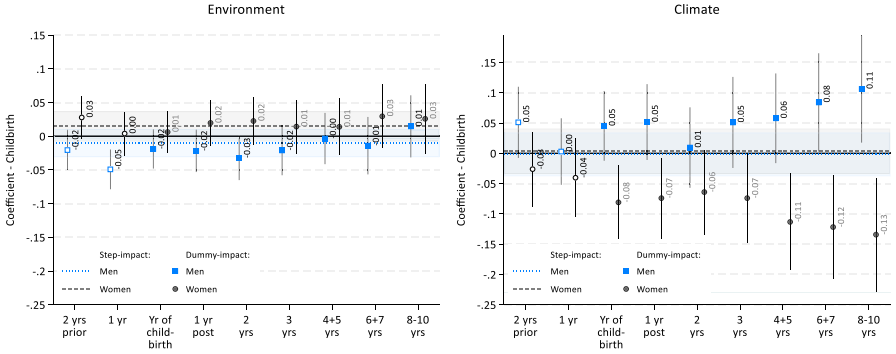

Fig. 5 Childbirth and parents' planetary concerns: gender differences for first births. Note: Coefficients from separate FE models accounting for age and period effects of individuals. 95% confidence intervals. Empty markers refer to times pre-birth while filled markers refer to times of birth and after. Source: GSOEP v37 (1984 - 2020). Full models in Online Supplementary Table A6

Conversely, fathers again showed higher levels of concern, though these effects only reached statistical significance as the child grew older.

In addition to gender differences, we explored potential effect heterogeneity by education, comparing respondents with tertiary education to those with lower levels of educational attainment (Fig. 6). For respondents without tertiary education, the results revealed small and rather negative relationships between childbirth and planetary concerns, although none of the coefficients reached statistical significance. On the contrary, for tertiary-educated respondents, we found a negative and marginally statistically significant anticipation effect on environmental concerns in the year before childbirth. Moreover, as the child grew older, planetary concerns increased again for tertiary-educated respondents. However, none of the effects was statistically significant, suggesting that education alone may not be sufficient to drive consistent changes in planetary concerns.

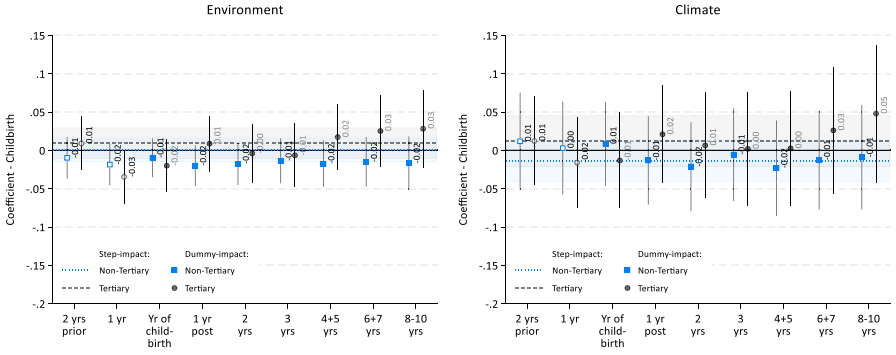

Fig. 6 Childbirth and environmental and climate concerns: educational disparities. Note: Coefficients from separate FE models accounting for age and period effects of individuals. 95% confidence intervals. Empty markers refer to times pre-birth while filled markers refer to times of birth and after. Source: GSOEP v37 (1984 - 2020). Full models in Online Supplementary Table A7

In the final step, we re-examined gender differences across educational backgrounds (see Fig. A1). For climate concerns, there were no notable gender differences between educational groups: both highly and less-educated men showed mostly positive changes, while highly and less-educated women exhibited mostly negative changes, consistent with overall gender patterns. For environmental concerns, however, gender differences were more pronounced among lower-educated respondents. Among men, the overall negative changes were primarily driven by statistically significant effects in the less-educated group, while tertiary-educated men showed more fluctuation around childbirth, followed by small, statistically insignificant recoveries and later increases. Among women, the overall pattern of increased environmental concerns masked underlying educational differences: lower-educated exhibited stable, small, and statistically insignificant increases in environmental concerns, while tertiary-educated women showed no or minimal initial changes, followed by positive but statistically non-significant increases in later years. These results suggest that while climate concerns remain consistent across educational groups and genders, education is more apparent for environmental concerns, particularly among (lower educated) men.

Sensitivity analyses

To assess the robustness of our results, we conducted several sensitivity analyses; however, all additional results showed comparable patterns and effect sizes as our main findings. First, we re-estimated our results with a more balanced sample, requiring respondents to have been observed in at least four waves (results available on request). We also restricted both items to the same observation period to ensure a comparable time horizon, reducing the sample to observations between 2009 and 2020 (Supplementary Fig. 2A). In addition, we estimated two types of models, one accounting only for age and period effects, and a full model that additionally included period dummies for prominent catastrophes and natural disasters. All models showed comparable patterns (available on request). Lastly, we distinguished respondents from East and West Germany but found no statistically significant differences in the childbirth effect (Fig. A3). However, results suggested more diminishing environmental concerns in the West compared to more positive patterns in East Germany. Conversely, changes in climate concerns were mixed and, again, statistically not significant. Moreover, we examined gender differences within East and West (Fig. A4) but found no East–West specific gender disparities, thus confirming overall patterns of mostly positive changes in environmental concerns for women and decreased concerns for men and vice versa results for climate concerns.

Discussion

By exploiting rich individual-level panel data from the Socio-economic Panel Study for Germany (GSOEP, 1984–2020), this is the first study that provides more robust longitudinal evidence on the association between childbirth and parents' environmental and climate concerns. Drawing on theories of time availability and gendered roles, we hypothesized that the birth of a child would

temporarily diminish environmental and climate concerns in the immediate years around childbirth, but—in alignment with the legacy hypothesis—that these would recover and possibly increase as the child grows older. We also anticipated increases in planetary concerns prior to childbirth as parents start to consider their unborn child's future and potential immediate risks to the child's well-being. Furthermore, we expected these changes to vary across gender and educational attainment.

Results from linear probability regression models with individual FE revealed several key insights. Contrary to the legacy hypothesis, we observed small, mostly negative, and mostly statistically non-significant associations between childbirth and climate and environmental concerns in the years around childbirth. These findings align with recent studies from New Zealand and the UK (Milfont et al., 2020; Thomas et al., 2018), suggesting that, on average, childbirth is not associated with substantial increases in planetary attitudes.

However, to move beyond average childbirth effects or focus only on the early years around childbirth, we employed FE models with a dummy impact function to capture the nuanced and dynamic relationship between childbirth and planetary concerns over time. Notably, these dynamic models highlighted that childbirth is mostly associated with temporary decreases in environmental concerns—both in the years before and immediately after childbirth. However, only environmental concerns demonstrated a statistically significant negative anticipation effect. As time progressed, these altered environmental concerns slightly recovered to pre-birth levels as changes in day-to-day demands of parenting and a shift in priorities may mitigate these concerns. In terms of climate concerns, our overall results suggested similarly that these concerns decline but eventually recover to pre-birth levels in the years after childbirth.

Additionally, we explored how gender and educational attainment moderate the relationship between childbirth and planetary concerns. Gender-specific analyses revealed surprisingly divergent patterns in environmental and climate concerns around childbirth. While men exhibited significant reductions in environmental concerns before and shortly after childbirth, with effects lasting until the child's age three, mothers showed a significant increase in environmental concerns two years prior to childbirth but stable, statistically insignificant changes afterward. For concerns about the consequences of climate change, reversed gender patterns emerged: fathers demonstrated increased and persistent worries, whereas mothers exhibited negative changes. In supplementary analyses, we focused on first births only; however, these results confirmed our main results. Overall, these item-specific gender differences suggest potentially distinct priorities and roles during this life stage, shaping how mothers and fathers perceive environmental and climate challenges. At the same time, these results challenge previous assumptions that mothers automatically develop stronger environmentalism (Blocker & Eckberg, 1997). Instead, we contribute to the body of research reporting negative associations or null effects between parenthood and environmental attitudes (Milfont et al., 2020; Thomas et al., 2018), while highlighting dynamic changes with important differences with regard to different constructs, measured as environmental and climate concerns.

Additional analyses of educational differences revealed small and statistically insignificant changes in planetary concerns around childbirth. Increases in planetary concerns were only observed among tertiary-educated respondents as the child grew older. Mostly negligible differences between educational groups suggest that higher educational attainment alone may not be sufficient to promote substantial changes in planetary concerns for the population under study. However, further analyses examining gender disparities in educational differences indicated that while changes in climate concerns were mostly consistent across educational groups and genders, differences were more pronounced for environmental concerns. Specifically, results revealed that lower-educated men showed the most pronounced and stable negative changes, whereas women's educational differences showed nuanced but statistically insignificant positive patterns over time. Hence, our results most likely reflect differences in gender-specific resources and stressors (e.g., social network, environmental literacy, care responsibilities, work pressures) that vary by educational level in their link with planetary concerns (Franzen & Vogl, 2013; Hartmann & Preisendörfer, 2021, 2024).

Several limitations should be considered when interpreting our findings. Firstly, our study focused on only two items measuring concerns about the environment and the impact of climate change, which may not capture the full spectrum of environmental attitudes. Secondly, the lack of behavioral measures prevents cross-validation of self-reported planetary concerns. Future research should investigate the attitudes-behaviors link and its variation across cultural and socioeconomic contexts. Additionally, our analysis spanned a lengthy time, during which the interpretation of survey questions and societal perspectives on environmental issues may have evolved. Lastly, while our dataset is substantial, the number of childbirth events available for analysis, particularly in certain subgroups, restricted our ability to conduct more detailed subsample analyses. Future research should therefore explore the underlying mechanisms that drive the childbirth effect on planetary concerns, considering factors such as altered behavior and constraints, parental roles, family dynamics, birth parity, societal norms as well as contextual differences. Furthermore, longitudinal studies with extended observation periods seem crucial for capturing the dynamic shifts in environmental concerns that might occur over time. Lastly, to better understand the variations in results across different items related to planetary concerns, future quantitative and qualitative research should critically evaluate what these measures capture and how they align with broader constructs of environmental and climate attitudes as well as changes in environmental behaviors or policy-making.

Despite a range of limitations that highlight avenues for future research, our study contributes valuable insights into the complex dynamics of altered planetary concerns due to life-course events such as childbirth. By using rich longitudinal data and more advanced and robust analytical methods compared to previous research, our study contributes to the ongoing discourse on the relationship between parenthood and planetary concerns. Our findings suggested that while the birth of a child may initially reduce parents' concerns, these negative effects tend to diminish in the years that follow. Our findings therefore challenge the notion that parenthood universally heightens planetary concerns, emphasizing instead the complex interplay between parenthood, gender, education, and planetary concerns. Especially the

gendered differences observed across the two items—capturing climate and environmental concerns respectively—suggest that mothers and fathers are likely to experience distinct priorities and roles, shaping their planetary concerns in different ways. However, further research is needed to elucidate the underlying mechanisms and interactions among these factors, offering a more comprehensive view of how planetary concerns evolve in the context of parenthood.

From a broader perspective, our results have implications for policymakers and environmental advocates seeking to engage individuals in sustainable attitudes and behaviors (Bamberg, 2003; Enzler & Diekmann, 2019; Glasman & Albarracín, 2006). Unfortunately, our findings suggest that family formation might not be the most favorable life-course phase for fostering increased environmental awareness as many parents might shift preferences and priorities toward immediate family needs and short-term challenges. Although this shift often coincides with less pro-environmental behaviors, it does not necessarily reflect a permanent decline in planetary concerns or rejection of the legacy hypotheses, as illustrated by some of the gender- and education-specific results. Rather than placing responsibility solely on individual parents, it is crucial to recognize that environmental attitudes develop within broader structural and intuitional contexts. Our results therefore suggest that parents may benefit from systematic support in balancing immediate family demands with long-term sustainability goals. Overall, understanding the dynamics in attitudinal formation following life-course events such as childbirth—also from diverse country contexts and comparative studies—should be considered essential for designing effective policies that align family needs with broader sustainability objectives in an ever-changing world.

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Author contributions Zoch: conceptualization, formal analysis, investigation, methodology, writing—original draft, writing—review and editing, project administration, and visualization. Kapelle: conceptualization, methodology—support, writing—review and editing, visualization—support, and project administration—support.

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Data availability The paper uses data from the German Socio-economic Panel Study (https://doi.org/10.5684/soep.core.v37eu). Data are available from the German Socio-economic Panel Study (SOEP) (for requests, please contact soepmail@diw.de). The scientific use file of the SOEP with anonymous microdata is made available free of charge to universities and research institutes for research and teaching purposes. The direct use of SOEP data is subject to the strict provisions of German data protection law. Therefore, signing a data distribution contract is a precondition for working with SOEP data. The data distribution contract can be requested with a form, available at: http://www.diw.de/soepforms. For further information, contact the SOEPhotline (soepmail@diw.de).

Declarations

Competing interests The authors have no relevant financial or non-financial interests to disclose.

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