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## Fertility Decline in Iceland, 2013-2022: Trends and Structures

Ari Klængur Jónsson

**Abstract:** Iceland is one of the Western countries that have experienced an unexpected fertility decrease in the 2010s. In this study, the aggregate Icelandic fertility decline is dissected to explore which fertility components are the main drivers behind the decline since 2010 in order to better understand whether the development is associated with compositional changes or linked to changes such as increased propensities of childlessness and decreased propensities to have another child. As such, it contributes empirical evidence to ongoing theorisation within current fertility debates. Official administrative register data are analysed by means of event-history analysis. Findings are presented as parity-specific birth risks and in the form of Kaplan-Meier estimates of synthetic period-based cohorts of women and men progressing to parity one over calendar years. In terms of results, we find that the fertility decline was concentrated around first births, and the decline can principally be attributed to women under the age of thirty. Propensities to remain childless have increased slightly since 2013, while there were no declines in the intensities to have a second and a third child. Hence, the development in Iceland appears to be driven by clear postponement of parenthood but not altered childbearing behaviour in terms of propensities to have a second and a third child. Results do not necessary contradict theories under the umbrella of the gender-relations framework, but they highlight the importance of exploring other factors impacting the transition to parenthood, such as perceived global and welfare uncertainties. Socioeconomic differentials in first-birth fertility and factors affecting postponement and ultimate childlessness should be explored further, as well as short-term developments in higher-order birth intensities during adverse circumstances, such as the 2008 economic crisis and the Covid-19 pandemic, during which periods the third-birth intensities increased.

**Keywords:** Fertility · Fertility trends · Iceland

### 1 Introduction

For roughly three decades, between 1980 and 2010, the Total Fertility Rate (TFR) of Iceland remained relatively high and stable. The TFR averaged around 2.1 children per woman and fluctuations in the rates were relatively small. Icelandic fertility was

among the highest in Europe and the country surpassed the other Nordic countries, Denmark, Finland, Norway, and Sweden, in terms of fertility outcomes (Jónsson 2017). However, during the past decade, fertility has declined almost continuously from one year to the next, repeatedly reaching new historically low levels. In 2022 the TFR was 1.59 – a new all-time low for the country. Prior to 2013, the relatively sturdy TFR of Iceland had hardly dropped below 2.0: 1.93 was the previous lowest point in the mid-1980s and again in 2002 (*Statistics Iceland* 2023). While Iceland is not an exception in this regard – i.e., fertility has declined in most developed countries since the great recession of 2008-2009 (Matysiak et al. 2021; Vignoli et al. 2020a) – this is nevertheless remarkable. In the words of Vignoli and his colleagues (2020a: 1): “[c]ontemporary Europe is facing a new fertility winter”; and Iceland appears to be one of the countries that are freezing.

In the case of Iceland, we do not fully know whether this development is fuelled by compositional effects related to previous fertility and changes in parity-specific age schedules, or whether reasons are connected to changes in the underlying childbearing behaviour as such. As a fertility measurement, the TFR has shortcomings. The TFR does not account for parity or birth intervals, and thus, the actual group under exposure may be distorted (Jónsson 2017; *Ní Bhrolcháin* 1987). To gain knowledge about the determinants behind the fertility development, we need to establish which fertility components are the main drivers behind the decline, i.e., whether the engine is fuelled by the postponement of becoming a parent; increased levels of childlessness; declining propensities to have a second and a third child; or if it is a full-fledged fertility decline, irrespective of birth order. Different explanations may apply to each of these factors, depending on their contribution to the fertility decline.

The main objective of this contribution is to provide insight into the trend of recent fertility decline by focusing on each of these fertility components using a period perspective. Longitudinal administrative register data are analysed by means of event history techniques. As such it is an update of Jónsson's (2017) study covering the childbearing trends in Iceland during 1982-2013. For the first time, we also provide information on parity-specific fertility behaviour of men in Iceland. An in-depth analysis of Icelandic childbearing trends advances our understanding of this intriguing development as well as contributes empirical evidence to ongoing theorisation within current fertility debates (see e.g., Comolli et al. 2021; Vignoli et al. 2020b). The Icelandic saga is an interesting case-study, as the country is considered one of the forerunners of family-demographic change (Hellstrand et al. 2021; Jónsson 2021, 2020), and as such has the potential to provide novel insights that are relevant also for a broader contextual setting.

## 2 Theoretical Background

To a large extent, the usual suspects in terms of explaining fertility change, such as fluctuations in the business cycle (Sobotka et al. 2011; Andersson 2000), reforms in family policies (Duvander et al. 2019; Jónsson 2018; Andersson 2004), and development

in gender relations (*Goldscheider et al.* 2015; *McDonald* 2000), appear to be shooting blanks when it comes to providing insight into this recent development depicted by an almost universal drop in fertility. In Iceland for instance, economic development was positive during most of the past decade (*Statistics Iceland* 2023), which, according to several studies, should have had an elevating effect on fertility – rather than the opposite (*Comolli* 2017; *Sobotka et al.* 2011; *Hoem* 2000; *Andersson* 2000). Reforms in family policies were also made during this time; the parental leave was extended from nine months to twelve, and the cap on parental leave benefits was raised (*Alþingi* 2020). However, a trend of increased fertility did not follow, contrary to what happened after a parental leave reform in Iceland at the beginning of the 21<sup>st</sup> century (*Jónsson* 2018). In relation to gender equality, Iceland is considered the most gender-equal country in the world (*World Economic Forum* 2023), which should, from a theoretical perspective, result in a relatively high fertility (*Goldscheider et al.* 2015; *Esping-Andersen/Billari* 2015; *McDonald* 2000).

According to the gender-relations theoretical framework, social norms, attitudes, and social institutions need to promote and enforce gender equity within societies and enable people to reconcile work and family life, so that women do not need to choose between building a career and having children. For instance, *Goldscheider et al.* (2015) argue that a gender revolution needs to materialise, which involves men and women to participate equally within the home sphere and to share the burden of family life for fertility to increase. In a similar vein, *Esping-Andersen* and *Billari* (2015) conclude that gender egalitarian norms need to become dominant within societies and be supported by social institutions for a platform of elevated fertility to develop. *McDonald* (2000, 2013) claims that modern fertility outcomes are directly related to how women perceive the actual opportunities they have to combine work and family life. Gender egalitarian family policies must support parents so that women do not need to choose between having a family or a career.

The Nordic countries are among the most gender egalitarian societies in the world. Also, they have implemented some of the most beneficial family policies in Europe, such as generous parental leave programs and highly subsidised universal childcare systems, which are an integral part of the Nordic welfare regime (*Korpi* 2000). The combination of (the previously) relatively high fertility across the Nordic region and high rates of labour-force participation among men and women have been attributed to their egalitarian and comprehensive welfare states (*Esping-Andersen et al.* 2002; *McDonald* 2000). In Iceland, the duration of the parental leave is twelve months which is divided equally between the parents (while either parent can transfer six weeks of the leave to the other parent) (*Alþingi* 2020). At the age of two, almost all children are enrolled into the preschool system (*Jónsson* 2018). Nevertheless, as is the case for the other Nordic countries, which all have a similar family-policy setup, during the past decade, Iceland has been experiencing its most severe fertility crisis in modern times – regardless of the country's generous policies and their gender egalitarian emphasis. The Total Fertility Rates of Iceland, Norway and Finland are at an historic low, and the TFRs of Denmark and Sweden are close to the same mark (*Nordic Statistics* 2024). This poses certain challenges to researchers, not only because the ongoing fertility drop was unforeseen, but primarily because

the contemporary theories did not predict the current situation in the Nordics to unfold (*Vignoli et al.* 2020a).

Since the 1980s, advocates of a second demographic transition have associated the weakening role of the family and declining fertility in developed countries with increased individualism and people's growing need for self-fulfilment (*Lesthaeghe* 2010). Authors of the narrative framework on the other hand propose that in the aftermath of the great recession of 2008-2009, the recent "fertility winter" is connected to individuals' subjective narratives of their future and the rise of diverse uncertainties in a highly globalised world (*Vignoli et al.* 2020a/b). People, they argue, produce their own personal narratives of the future – always under certain levels of uncertainty – which again are embedded in social elements and their interactions. While fundamental uncertainty has always accompanied fertility decisions, the escalating speed of daily life, innovation and technological change, increased income inequality and volatile markets make it harder for individuals to imagine their future and choose between alternatives. These fictional narratives, or imaginative futures, are partially deducted from past experiences, but more importantly they are products of people's current conditions and their expectations of future status (*Vignoli et al.* 2020a/b).

Arriving from a similar explanatory standpoint, *Comolli et al.* (2021) found that in the aftermath of the great recession, fertility response across countries, parities, ages, and educational groups was surprisingly uniform across the Nordic region. Rather than placing a strict focus on the potential effects of economic indicators in explaining subsequent fertility outcomes, such as gross domestic product growth rates and unemployment rates, the authors argue that we also need to consider the role of welfare states, their typology, and governmental reactions at the time of economic crisis. While welfare retrenchments might have an impact on period total fertility in the short term, taking into account what the authors refer to as individually *perceived welfare and global uncertainties* might provide us with better insight into the (at the time of the writing) ongoing fertility decline – not only in the Nordic countries but in most other developed countries as well: "To view childbearing outcomes after a crisis from a broader perspective that incorporates economic and welfare state issues as well as individual perceptions of – economic, welfare, and global – uncertainties may help piece together the puzzles regarding post-crisis and current fertility declines." (*Comolli et al.* 2021: 497).

### 3 Data and Methods

To fulfil the objectives of the study, we use longitudinal administrative register data from Statistics Iceland that cover the total population born in Iceland at relevant ages for childbearing during the study period. We construct life-course histories of everyone residing in Iceland during 1998-2022 and follow them between ages 15 and 46. By means of event-history analysis, we calculate the relative risks of giving birth to a first, second, and third child, standardised for age of men and women, and, where appropriate, duration from previous birth, using parity-specific, piecewise constant

exponential models, and depict them as annual indices of the force of fertility during a period of 25 years (cf. *Hoem* 1993; *Andersson* 1999; *Jónsson* 2017). As such, the estimates are standardised period rates that reflect the childbearing behaviour of the relevant population at risk (*Ní Bhrolcháin* 1992; *Andersson* 1999). We also provide Kaplan-Meier non-parametric estimates for synthetic period-based cohorts in their progressions to become a parent for women and men and, for women only, changes in birth spacing over the study period in terms of the progressions to a second and third child. Combined, the analyses advance our knowledge about whether the fertility decline during the past decade was driven by compositional changes or if it was mainly related to changes in the underlying childbearing behaviour at different birth orders. To gain deeper context and detect potential changes that had begun already before our study period of interest, we start the observations in 1998 and thus provide a quarter-of-a-century long overview of Icelandic fertility trends. For a detailed discussion about methodology see: *Hoem* (1993); *Andersson* (2000; 1999); and *Jónsson* (2017).

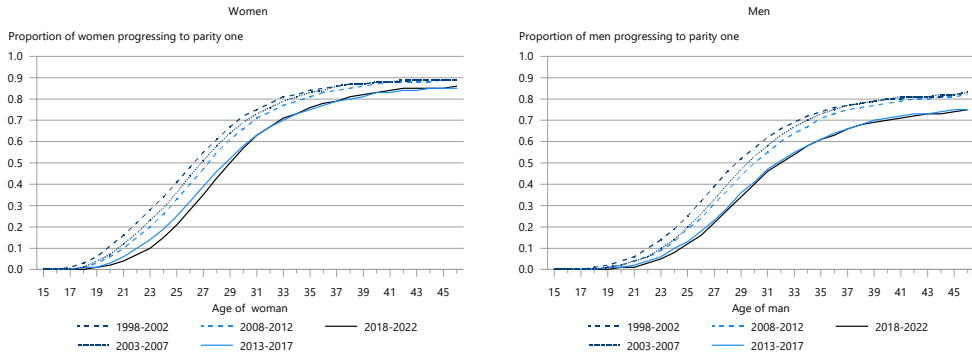
### 3.1 Variables

In terms of first births, our main duration variable is the subject's age. The time unit is measured in person-months and categorised into 31 single-year age groups (15-45). Childless individuals become exposed at age 15, and they enter the analysis in 1998 or the month they turn 15 – whichever comes last. The subjects are followed until they become a parent or are censored: i.e., if they emigrate, die, turn 46, or reach the end of the study period in December 31, 2022 – whichever comes first. When it comes to birth orders two and three, our subjects become exposed at the time of previous birth. Parents enter the analyses at that time or in 1998, whichever comes last. The main duration variable is the age of the last-born child, measured in months from birth, and categorised into nine groups: 1-12 months; 13-24 months; 25-36 months; 37-48 months; 49-60 months; 61-72 months; 73-96 months; 97-120 months; and 121 months and more. The parent's age is categorised into 12 groups. Subjects are right-censored on the same grounds as for first births and left-censored if multiple births occurred the first/second time, parents were older than 45 when they had their last child or emigrated before having their first/second child. Calendar year is included in 25 single-year categories (1998-2022) in Figures 2, 3 and 4 and in five-year groups in Figures 1 and 5: 1998-2002; 2003-2007; 2008-2012; 2013-2017; 2018-2022. Observational spells that refer to periods before 1998 are excluded from the analyses (left-truncated).

### 3.2 Results

Figure 1 shows Kaplan-Meier cumulative probability estimates of synthetic cohorts of childless men and women progressing to parity one before turning 46 by calendar-year groups. The figure depicts a postponement of parenthood during the full study period, as the estimates indicate that the age at which half of the men and women have progressed to parenthood increased by about three years between the first

**Fig. 1:** First-birth Kaplan-Meier cumulative probability estimates for Iceland in 1998–2022, by age of women and men over calendar-year synthetic cohorts



Source: Icelandic register data, author's calculations

and last years of observation. The non-parametric estimates also demonstrate that the tendency of remaining childless became much stronger from 2013 onward, and more so for men than women. According to the estimates, approximately 11 percent of women and 17–18 percent of men were prone to stay childless at age 46 prior to 2013, but 14–15 percent and 25 percent respectively during 2013–2022.

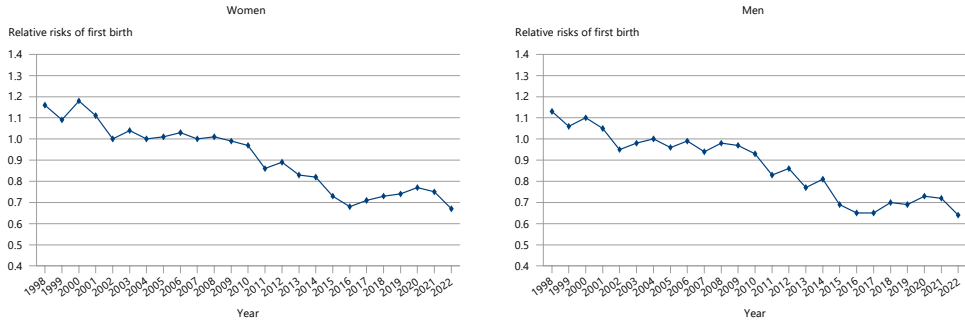
Figure 2 displays first-birth risks relative to the year 2004. The estimates show that after a relatively stable period during 2002–2009, the first-birth intensities declined quite drastically between 2010 and 2016. From 2016 onward, the decline in first-birth rates seems to have come to a halt.

Figure 3 depicts this development in more detail. Here, we use two separate models, one for ages 15–29 and another one for ages 30–45. As such, the estimates are only comparable within models and cannot tell absolute differences between the two categories in the propensity to become a parent. As Figure 3 shows, the decline in the first-birth rate was mainly driven by decreasing first-birth intensities among people in the younger age bracket. This decline seems to have stopped in the period after 2016. However, during the Covid-19 pandemic, with births occurring in 2022 in particular, we see a tendency of renewed decline.

The estimates for second- and third-birth intensities in Figure 4 are derived from two separate models and presented with risks relative to the year 2004 for each parity. The figure shows that during the past twenty years there has been no decline in second-birth intensities. In contrast, they have constantly been higher than what they were in 1998–2003, i.e., before a new parental leave legislation was fully implemented, and that was associated with shorter birth intervals (Jónsson 2018). There was even a small peak in 2008–2010, around the time Iceland was going through an economic crisis, and again in 2021–2022, i.e., during the pandemic.

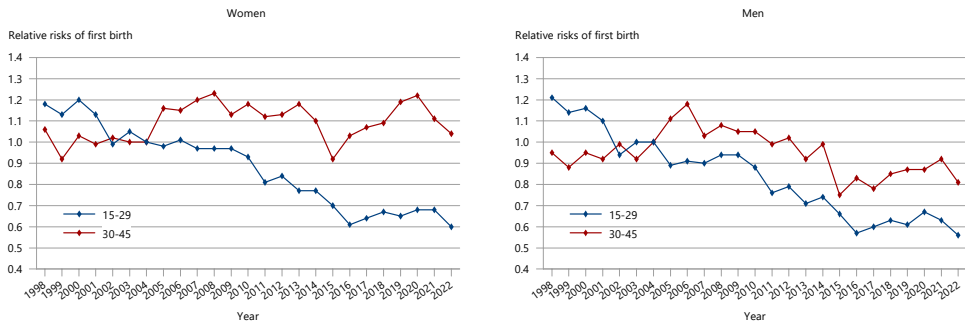
Among women, the fluctuations in third-birth rates are much stronger, and not only moving in an upward direction. The culprit behind this is mainly the development during the economic crisis in 2008–2012, when third-birth rates were

**Fig. 2:** Relative risks of first birth in Iceland 1998-2022. Standardised for age of women and men. Rates are relative to first-birth rates in 2004 for each group (separate models)



Source: Icelandic register data, author's calculations

**Fig. 3:** Relative risks of first birth in Iceland 1998-2022. Standardised for age of women and men, two age groups. Rates are relative to first-birth rates in 2004 for each age group (separate models)



Source: Icelandic register data, author's calculations

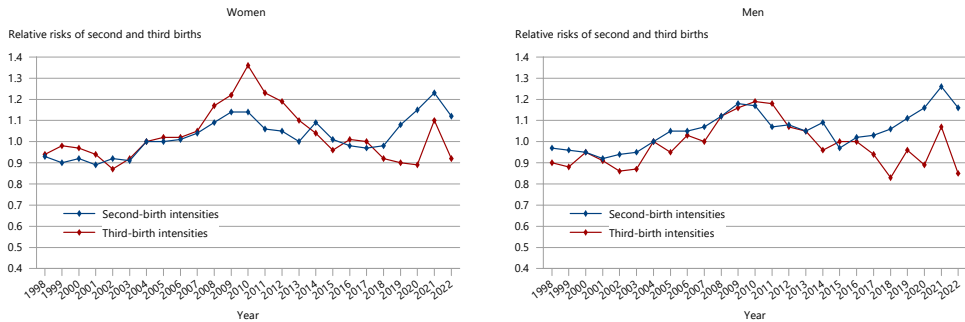
higher than in most other years (see *Comolli et al. 2021; Jónsson 2018*). On average, however, between 2013-2022, the propensity to have a third child was similar to what it was prior to the economic recession, albeit with sizable variation. A peak occurred in 2021, during the Covid-19 pandemic (Fig. 4).

We conclude with an analysis of the developments in birth spacing patterns between subsequent children for mothers only (Fig. 5). The estimates are relative to the risks of women whose youngest child was in its second year in 1998-2002. For second births, we can detect a pattern where birth intervals get shorter and second-birth intensities higher. When we examine the birth spacing patterns between second and third child, Figure 5 suggests that the period during the economic crisis (2008-2012) was somewhat of an anomaly. The propensity to have a third child increased over all durations since the birth of the second child during this period,



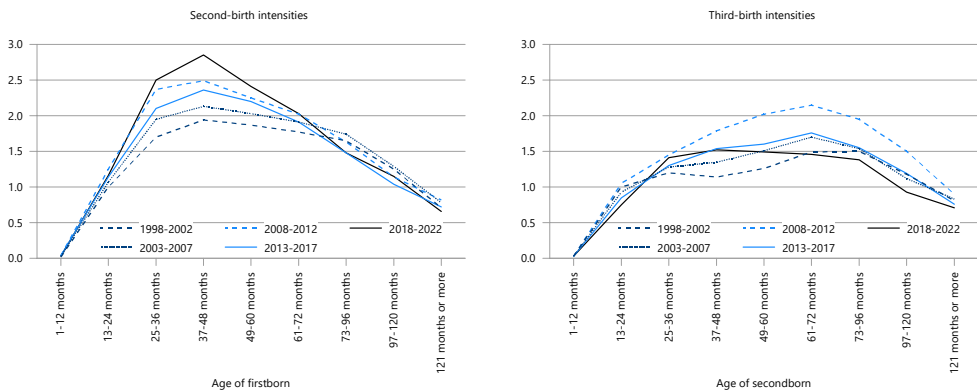
thus indicating not only changes in tempo but also in the quantum of childbearing. After this, third-birth fertility retracted to previous levels.

**Fig. 4:** Relative risks of second and third births in Iceland 1998-2022. Standardised for age of mother, age of father, and age of youngest child. Rates are relative to the rates in 2004 for each birth order (separate models)



Source: Icelandic register data, author's calculations

**Fig. 5:** Second- and third-birth risks in Iceland 1998-2022 by time since previous birth. Standardised for age of mother. Rates are relative to duration 13-24 months in 1998-2002



Source: Icelandic register data, author's calculations

## 4 Discussion

The objective of this study was to dissect the Icelandic childbearing trends and investigate whether the aggregate fertility decline during the past decade was related to compositional changes, previous childbearing history, or linked to changes such as increased propensities of childlessness and decreased propensities to have

another child. Our analysis shows that the fertility development in Iceland was entirely driven by a decline in the propensities to become a parent. This resembles what has also been found in Sweden and Finland (*Ohlsson-Wijk/Andersson 2022; Hellstrand et al. 2022*), i.e., that there were no or relatively weaker declines in the propensities to have a second and third child but a clear decline in the propensity to become a parent. In Iceland, the first-birth intensities declined strongest during 2012-2016, and the decline can be attributed to women younger than thirty years. Hence, contrary to the other Nordic countries, we did not observe any declines in the first-birth risks among women in their 30s and 40s, suggesting that the decline in first-birth childbearing may be related more to fertility postponement than actual declines in the ultimate levels of becoming a parent. Nevertheless, our Kaplan-Meier synthetic-cohort estimates indicate that the tendency of remaining childless increased slightly during 2013-2022.

*Hellstrand et al. (2021)* estimated that 26 percent of the aggregate fertility decline in Iceland between 2010 and 2018 could be attributed to a decrease in the number of third births. Our findings also show that the third-birth intensities declined compared to the economic-crisis period in 2008-2012. Nevertheless, the third-birth risks among women during that period were exceptionally high, compared to the periods before and after the economic recession. In terms of second births, we find a pattern of steadily increasing birth rates, which was largely driven by a movement toward even shorter intervals between the first and second child. As for second births, we found higher levels of third births during the pandemic period, a pattern that has also been found in other Nordic countries.

Our findings thus demonstrate that since 2010, Iceland has not been experiencing a full-fledged fertility decline, as the drop in fertility was concentrated around first births. Still today, about 85-90 percent of one-child mothers have a second child in Iceland and more than half of two-child mothers have a third child (results not shown but available upon request). The stability in second- and third-birth intensities over a quarter-of-a-century in Iceland indicate that the gender-relations framework still has considerable explanatory power, but that other factors, such as perceived welfare uncertainty as presented by *Comolli et al. (2021)* might be affecting people's commitment towards parenthood – regardless of the level of diffusion of gender egalitarian norms within societies.

A potential explanation for why ultimate childlessness in Iceland did not increase to the same extent as in the other Nordic countries could be related to some kind of pathway dependency in terms of childbearing. Historically, fertility of Iceland has been higher and ultimate childlessness lower than that of the other Nordic countries. In the 1980s and 1990s, the TFR of Iceland remained relatively high in spite of family policies and governmental support aimed at families were less developed in Iceland compared to the other Nordic countries, while levels of female labour force participation were similar (*Jónsson 2018*) – which could be regarded as evidence of more resilient childbearing intensities in Iceland.

Currently, Iceland has a similar policy set-up as the other Nordic countries. Nevertheless, it is remarkable how similar the childbearing trends during the past decade have been across these five countries – considering that Iceland is

an independent island some thousand kilometres away from the nearest coast of Norway. As *Comolli et al.* (2021) point out, the interplay of globalisation and new technologies, smartphones, and social media, in addition to elements of globalised pop culture, pandemics and wars, may increase perceived uncertainties, across national borders, and promote and influence shared ideas or distress that cannot be controlled locally or nationally. Although our analysis is hardly equipped to make strong inferences in this regard, the concepts of global and welfare uncertainties could help to explain the drastic drop in first-birth fertility in Iceland, as it happened parallel to similar developments in the other Nordics, and elsewhere (cf. *Comolli et al.* 2021). Affected by some shared global uncertainties, people may come up with similar future-life narratives, irrespective of other contextual factors, discouraging them to become parents (cf. *Vignoli et al.* 2020a).

Future research, with richer data, should investigate whether the recent evidence of increased childlessness in Iceland is mainly a temporary phenomenon or rather part of a more long-term trend. It should also investigate how it is associated with socioeconomic status and, for example, whether it is more prominent among the less educated, as *Jalovaara* and colleagues (2019) have found in the case of the other Nordics. As a matter of fact, we do not know how educational attainment and first-birth fertility is related in Iceland, opposite to what holds for the other Nordic countries (*Comolli et al.* 2021). Finally, especially in terms of third births, researchers should explore why higher-order birth intensities appear to increase in the short-term in Iceland during periods of very adverse circumstances, such as during the economic crisis of 2008 and the Covid-19 pandemic, and the interplay of childbearing and the welfare system during these periods.

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