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RESEARCH ARTICLE

The fertility timing gap: the intended and real timing of childbirth

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Abstract

The fertility gap, which indicates the difference between the planned and actual number of children born, can be explained by the shift in parenthood to older ages and is associated with the non-attainment of one's intended reproductive plans. This paper focuses on the gap in the timing of entry into parenthood, i.e. between the planned and actual age at the birth of the first child. The study is based on data from the Women 2016 survey which re-interviewed women of fertile age from the second wave of the Czech Generations & Gender Survey conducted in 2008. At the population level, the fertility timing gap differs across generations. While for Czech women born between 1966 and 1971 the planned age exceeded the actual observed age by one year, the realisation of fertility occurred two years later than planned for the youngest generation (1983–1990) included in the study. At the individual level, the later-than-planned realisation of fertility was found to be related primarily to partner-related factors.

Keywords: Fertility timing gap; first birth; Czechia; postponement reasons

Introduction

In the context of below-replacement fertility levels in Europe, the fertility gap, defined as the difference between the intended and actual number of children born, has recently received considerable attention in the literature. The results of various studies point to the fact that the number of actual births in European populations does not match the number of intended births (Testa, 2012; Harknett and Hartnett, 2014; Beaujouan and Berghammer, 2019; Guzzo and Hayford, 2023).

The non-achievement of intended reproductive plans is closely linked to the timing of the birth of the first child (Berrington, 2004; Kapitány and Spéder, 2012; Beaujouan and Berghammer, 2019), which establishes the lower limit of a woman's reproductive life span. Shifting this event to a higher age thus shortens the overall reproductive window since the upper limit for women is determined biologically and cannot be extended. Moreover, it is known that a woman's ability to conceive decreases with increasing age (Leridon, 2017). The literature reports that a delay in the timing of the first childbirth initiates the so-called postponement effect, which leads to the non-realisation of the intended birth of higher-order children (Bratti and Tatsiramos, 2012; TimÆus and Moultrie, 2013).

Due to the widespread availability and reliability of contraception, motherhood has become a conscious choice (Mills *et al.*, 2011), which enables women and their partners (Duvander *et al.*, 2020) to plan parenthood based on individually-defined objectives that they wish to attain before entering this life stage (Lebano and Jamieson, 2020; Rotkirch, 2020). The timing of reproduction is, as well as quantum, a complex process whereby the resulting reproduction is the product of the traits, desires, and intentions of both individuals in the couple. Moreover, the certainty of reproductive intentions may vary based on age and partnership status (Ní Bhrolcháin and Beaujouan, 2011). Miller's model of reproductive decision-making considers the quantum and timing at the level of desires, intentions, and behaviour, the results of which illustrate that fertility timing intentions affect the actual number of children born (Miller, 2011).

Since a discrepancy can be observed between the intended and achieved number of children (Harknett and Hartnett, 2014), a similar discrepancy can be assumed in terms of timing, i.e. between the intended and actual timing – the fertility timing gap. The existence of such a gap was suggested by a Dutch study (Verweij *et al*., 2020) that investigated the difference between the desired fertility timing and the realisation of the birth of the first child. The results of the study showed that while Dutch women and men wished to have a first child at relatively high ages (around the age of 30), up to half failed to fulfil their initial intentions. However, the study does not clearly define which factors lead to later childbirth intentions in general, the re-evaluation of these intentions and the non-fulfilment thereof. Moreover, the analysis of the fulfilment of short-term reproductive intentions indicates that the countries of Central and Eastern Europe are even less successful in terms of the realisation of their childbirth plans than their Western European counterparts, especially concerning the first child (Kapitány and Spéder, 2012; Spéder and Kapitány, 2014; Kocourková and Šťastná, 2021). Thus, there is a gap in the expert literature regarding the timing of reproductive intentions and the observed timing of childbirth.

Our study focused on the fertility timing gap in Czechia where fertility postponement commenced significantly later than in Western European countries and was markedly more dynamic in terms of its development (Šťastná *et al*., 2017; Beaujouan, 2020). Moreover, regarding the realisation of the short-term childbearing intentions of Czech women, recent findings indicate that only one in four childless women realise their original transition to parenthood plans (Kocourková and Šťastná, 2021). The aim of this study was to examine the first childbirth fertility timing gap at the population level and to determine the extent to which its duration has changed as a result of changing reproductive patterns. In addition, we focused on the individual fertility timing gap and the reasons for the delayed realisation of individual intentions.

Fertility timing factors

The postponement of childbearing is understood as a demographic trend that indicates that cohorts have children later than previous cohorts. Fertility postponement has been conceptualised in the form of the theory of the second demographic transition, which relates to ideational and cultural shifts initiated by the higher prioritisation of autonomy and self-fulfilment (Lesthaeghe and Surkyn, 1988; Van de Kaa, 1997; Lesthaeghe, 2010). Since this theory was found not to provide a satisfactory explanation for the underlying mechanism behind fertility postponement in all European countries, an alternative theoretical explanation involving 'postponement transition' was subsequently proposed (Kohler *et al*., 2002), according to which the causal mechanism behind the delaying of childbearing in post-communist countries consists of economic uncertainty rather than value changes (Billingsley, 2010). Although these theories responded to the delay in the timing of childbirth, the various arguments can also be applied to explain further delays in childbirth timing, i.e. in cases where the child was born later than planned.

One of the main reasons advanced for the postponement of childbirth concerns the time spent in education (Barro and Lee, 2013), and for an increasing number of individuals, the normative closure of this life course phase is essential prior to moving on to the next phase – the starting of a

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family (Heckhausen, 2006). It is generally assumed that a higher level of education leads to securing higher quality employment positions, accompanied by enhanced stability and a higher income and, thus, a lower level of economic uncertainty. Conversely, the extension of the education life phase acts to postpone financial self-sufficiency and the formation of a family. Research has revealed that more educated women postpone their first childbirth due to both the period of education itself and a longer period between the completion of education and the first childbirth than less educated women (Neels *et al.*, 2017; Ní Bhrolcháin and Beaujouan, 2012). Early motherhood is often undesirable for women with university degrees due mainly to the interruption of their careers and the potential loss of their employment positions rather than financial reasons (Brough and Sheppard, 2022).

Economic security increases with the prolongation of economic activity before the first childbirth (Mills *et al.*, 2011). The perception of enjoying favourable material conditions is influenced by having a stable employment position (Gutiérrez-Domènech, 2008; Del Bono *et al.*, 2015; Miettinen and Jalovaara, 2020; Schmitt, 2021; Slabá, 2020; Vignoli *et al.*, 2020) and the availability of suitable housing (Kulu and Vikat, 2007; Rindfuss and Brauner-Otto, 2007; Mulder and Billari, 2010). A study from the United States revealed that later family formation is associated primarily with those generations born after 1990, which realised their fertility intentions following the economic recession of 2008 onwards, i.e. a period of increased financial uncertainty (Guzzo and Hayford, 2023).

The transition to motherhood is also frequently postponed due to the absence of a suitable partner as the potential father of the first child (Brough and Sheppard, 2022) or due to hesitation on the part of the partner in terms of agreeing with the woman's childbirth intentions (Duvander *et al.*, 2020; Testa and Bolano, 2021). Partner-related issues are commonly cited as one of the reasons for uncertainty regarding fertility intentions (Kuhnt *et al.*, 2021); they may act to delay the timing of fertility intentions or even lead to childlessness (Sobotka and Testa, 2008; Schmidt *et al.*, 2012).

Health problems represent a further factor that may lead to the postponement of childbirth or to childlessness (Molina-García *et al.*, 2019) since the effectiveness of infertility treatment is often overestimated (Lampic *et al.*, 2006) and assisted reproductive technology is unable to fully compensate for naturally lower levels of fecundity at higher ages (Leridon, 2017). An Australian study revealed that women who need medical help to conceive are generally older at first childbirth and that the desired and actual number of children's fertility gap is wider for such women (Choi *et al.*, 2023).

The study

The reporting of the fertility gap (the difference between intended and actual fertility) may be imprecise due to the level of reliability of the estimation of desired and intended fertility (Philipov and Bernardi, 2011). A similar problem clearly arises when attempting to measure the intended timing of childbirth. Fertility intentions are often determined by the responses to survey questions. Previous studies have revealed that the formatting of the survey questions influences the level of uncertainty of intentions (Ní Bhrolcháin and Beaujouan, 2011), thus rendering it difficult to assess differences between different surveys and countries (Brzozowska and Beaujouan, 2021). In addition, the aforementioned issues that influence the timing of fertility are often based on objective factors (educational attainment, age at completion of education and financial income). However, the same objective situation may be perceived differently at the individual level; thus, this study focuses on the fertility timing gap in terms of the perception of later-than-planned parenthood and the subjective assessment of the various related factors.

We employed data from the Czech Women 2016 survey (Kocourková and Šťastná, 2016), which comprised a follow-up to the 2nd wave of the first round of the Czech Generations and

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Gender Survey (GGS) conducted in 2008 involving a subsample of women of reproductive age. The Czech Women 2016 survey questioned only those women born in the period 1966–1990 so as to allow for the more detailed study of reproductive plans and their realisation than allowed by the standard GGS data. The questionnaire focused on fertility intentions and the timing and fulfilment of plans, as well as on the self-assessment of fertility timing and factors that may affect it. When compared to the fertility intentions declared by women in the 2008 survey wave, the Czech Women 2016 survey results revealed that even over the longer term, a significant proportion of women failed to fulfil their childbearing plans (40% of women who planned to have a child within three years in 2008 did not realise their reproductive plans in the 8 year period up to 2016) and finally postponed childbearing for significantly longer periods than originally planned (Šťastná *et al*., 2017, 2019). It was, therefore, deemed necessary to monitor the women's reproductive plans and their realisation, as well as barriers to realisation in more detail.

This paper studies the fertility timing gap based on data on Czech women born between 1966 and 1990, a period characterised by significant changes in fertility timing (Kocourková *et al*., 2022) due to both value changes (Polesná and Kocourková, 2016) and changes in the availability of contraception (Kocourková and Fait, 2011). According to the Human Fertility Database, by age 40 the mean age at first childbirth was 22.5 years for the generation of women born in 1966 and 27.9 years for women born in 1981. Firstly, the survey data were used to assess whether a gap existed between the planned and the actual age at the birth of the first child – the fertility timing gap – with concern to the various cohorts of women during the studied period. In addition, with respect to those women who subjectively perceived that their timing intentions were realised later than planned, an evaluation was performed as to whether the significantly later realisation of fertility than planned was associated with the specific group of factors (time spent in education, economic insecurity, partner difficulties, and health problems).

Data

The analysis was based on data obtained from the Czech Women 2016 survey (Kocourková and Šťastná, 2016), which involved the re-interviewing of 1,257 women born between 1966 and 1990 (41.8% of the original 2008 GGS wave 2 sample of women from the given cohorts for whom contact information was available). Despite the reduction in the number of participants, the final sample was considered representative of all the educational and age cohorts, i.e. the two characteristics that were deemed most significant in terms of differentiating reproductive behaviour. Moreover, the research approach was designed so as to allow for the cross-sectional analysis of the 2016 data. The analysis considered only those women who already had at least one child and women who were childless but planned to have at least one child and had already exceeded the intended age of the first childbirth. Since a substantial part of the analysis herein reflects the subjective evaluation of the respondents concerning the timing of the first childbirth, only women who answered all the relevant questions were included; hence, the final sample size was 1041 women.

For analytical reasons, the data were split into four cohort groups with differing fertility patterns. The groups were identified by applying the cohort approach (Sobotka *et al*., 2011; Kocourková *et al*., 2022), and the following cohort categorisation is based on a detailed study of the women's reproductive behaviour based on vital statistics (Kocourková *et al*., 2022). The first group comprised women born between 1966 and 1970 who witnessed the rapid development of fertility postponement; however, their reproductive behaviour still reflected the early fertility pattern. The 1971–1976 cohort was associated with the most intensive degree of fertility postponement, the 1977–1982 cohort experienced the commencement of the deceleration of the fertility postponement process, and the 1983–1990 cohort was identified as the first group to stabilise their fertility at later ages.

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Methods

The approach adopted in this study was firstly to quantify the fertility timing gap at the population level and then to analyse its causes at the individual level. The quantification of the fertility timing gap was followed by the evaluation of two ages at the population level: the planned age at first childbirth (*'What was your planned age at first childbirth?'*) and the actual age at first childbirth (based on the respondent's date of birth and the survey question: *What was the year and month of birth of your first child?'*). In addition, we analysed the age upon the completion of education (based on the respondent's date of birth and the survey question: *'In which month and year did you achieve this highest level of education?'*). The median values were computed for these three ages by applying the Kaplan-Meier analysis approach since it allows for the inclusion of censored observations in the analysis, and, moreover, the median values are less sensitive to outliers (e.g. a high age upon the completion of education due to additional education at later ages once the children had grown up). Concerning the age upon completing education, the censored observations comprised those women who were students at the time of the collection of the data. The censored observations for the actual age at first childbirth were those women who had not yet had their first child (but had already reached the planned age of first childbirth). The fertility timing gap at the population level was computed as the difference between the planned median age at first childbirth and the actual median age at first childbirth.

We then analysed the fertility timing gap at the individual level. Since the subject of our study concerned those women who had not fulfilled their fertility timing intentions, we applied the declared evaluation of the timing of the first childbirth (*'Compared to the planned age at first childbirth, how successful was your plan?')* – the first child was born according to plan, earlier than planned or later than planned. The individual fertility timing gap for those women who stated that their first child was born later than planned was computed as the difference between the planned and real age at first childbirth. The individual fertility timing gap for the women who were childless at the time of data collection (but had already reached the planned age of motherhood) was computed as the difference between the planned age and the age at the time of the collection of the data, which provided us with the minimum individual fertility timing gap value. A total of 425 women subsequently included in the analysis were then asked to rank the various reasons for their later-than-planned first childbirth: *'Rate each of the following statements according to how important a role it played in your first child being born later than planned'* using a scale of 1 (completely unimportant) to 4 (very important). The list of statements is provided in Table 4. Since these statements were mutually correlated, we reduced them to just four factors – career, material, partner, and health – by means of principal component analysis (see Table 4).

The length of the individual fertility timing gap was then entered into the multiple linear regression models as the dependent variable, while the independent variable in all cases comprised the four late childbirth factors (career, material, partner, and health). The explanatory variables in subsequent versions of the model comprised the woman's age at the time of the survey (so as to adjust the model for cohort variation in the fertility timing gap) and the number of children born (based on the survey question: '*How many children have been born to you until now?*'), which reflected the women's differing life stages at the time of the collection of the data and, thus, the potential differing retrospective distortion of the perception of the situation concerning the first childbirth.

Results

Fertility timing gap at the population level

The studied cohort groups differed in terms of the timing of reproduction (Kocourková *et al.*, 2022). A 5-year shift in the median age at completion of education was evident across these cohorts, from 19 years for the 1966–1970 and 1971–1976 cohorts to 24 years for the 1983–1990

Table 1. Cohort differences: median ages at final educational achievement, planned and real age at childbirth, and the fertility timing gap

Cohort	Educational achievement		Planned age at first childbirth		Real age at first childbirth		Fertility timing gap	N	% childless
	Median	95% CI	Median	95% CI	Median	95% CI			
1966–1970	19	(19–23)	23	(22–24)	22	(21–23)	**−1**	158	4%
1971–1976	19	(19–20)	25	(25–25)	25	(24–26)	**0**	219	3%
1977–1982	21	(20–23)	26	(25–27)	27	(26–28)	**1**	273	11%
1983–1990	24	(24–25)	27	(26–27)	29	(28–30)	**2**	391	44%

Note: Women 2016 survey, $N = 1041$. The median ages resulted from the Kaplan-Meier analysis.

cohort (Table 1). The increase in the median age at completion of education evinced a step-wise character, with the most significant change occurring between the 1977 and 1982 (21 years) and 1983–1990 (24 years) cohorts. However, the planned first childbirth age increased more evenly across the studied cohorts. Of the 1966–1970 cohort, half of the women planned to have their first child by age 23, while half of the 1983–1990 cohort planned to have their first child by age 27. The difference in the planned age of the oldest and youngest cohort groups of women was 4 years. However, in the case of the observed median age at first childbirth, the difference between the oldest and the youngest cohort groups was 7 years. This trend is also reflected in the fertility timing gap. While based on the median age women from the oldest cohort had their first child one year earlier than they planned (fertility timing gap $= -1$), women from the youngest cohort had their first child two years later than planned. In the case of the youngest group of women (1983–1990), 44% of the respondents were still childless and had already exceeded their planned age at first childbirth at the time of the interview and they had not revised their plans, as might be expected if their intentions had changed.

Personal evaluation of the timing of childbirth

Intentions concerning the timing of fertility are very difficult to measure since it is necessary to rely on the subjective declaration of the respondent in order to obtain this information, whereas in the case of the real age at childbirth, the measurement method is objective and requires only the observation of the age of the mother at first childbirth. Hence, we were interested in the women's subjective assessment of the success of fulfilling their plans concerning age at first childbirth. Of the total sample of 1041 women, 16% reported that their first child was born earlier than planned, 43% that it was born according to plan, and 41% that it was born later than planned. The fertility timing gap is clearly zero for those women who had their child according to plan. 7% of these women were still childless, corresponding to 29 women from the total sample, and surprisingly, these women belonged not only to the youngest cohorts (see Table 3). Possible explanations include mistakes when completing the questionnaire (e.g. a typing mistake when marking the planned age) and e.g. the adoption of the partner's child(ren), which acted to fulfil the woman's reproductive plans. The fertility timing gap for those women who declared an earlier birth than planned was −4 years, and concerning those that reported a later-than-planned birth +6 years (Table 2).

The proportion of women who declared the later birth of their first child than planned varied across the cohort groups: 27% of women in the 1966–1970 cohort, 33% of women in the 1971–1976 cohort, 37% of women in the 1977–1982 cohort, and 55% for the youngest cohort (1983–1990). The oldest group of women who declared a later childbirth than planned displayed a

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Table 2. Personal evaluation: Median ages at final educational achievement, planned and real age at childbirth, and the fertility timing gap

	Educational achievement		Planned age at first childbirth		Real age at first childbirth				
Evaluation of plan	Median	95% CI	Median	95% CI	Median	95% CI	Fertility timing gap	*N*	% childless
Earlier	19	(19–20)	25	(25–25)	21	(20–21)	**−4**	168	0%
According to plan	22	(21–23)	25	(25–25)	25	(25–26)	**0**	444	7%
Later	24	(24–24)	26	(26–27)	32	(31–32)	**6**	429	44%

Table 3. Fertility timing gap – cohort differences and the personal evaluation of timing

		Educational achievement		Planned age at first childbirth		Real age at first childbirth				
Cohort	Evaluation	Median	95% CI	Median	95% CI	Median	95% CI	Fertility timing gap	*N*	% childless
1966–1970	Earlier	19	(18–25)	23	(22–25)	20	(20–21)	**−3**	47	0%
	According to plan	19	(18–23)	22	(21–23)	22	(21–23)	**0**	69	4%
	Later	22	(19–26)	24	(22–25)	26	(25–31)	**2**	42	10%
1971–1976	Earlier	18	(18–22)	23.5	(22–25)	20	(19–21)	**−3.5**	40	0%
	According to plan	20	(19–23)	25	(24–25)	24	(23–26)	**−1**	106	1%
	Later	19	(19–21)	25	(25–28)	30	(29–31)	**5**	73	7%
1977–1982	Earlier	19	(18–23)	25	(25–27)	23	(20–24)	**−2**	36	0%
	According to plan	21	(20–23)	25	(25–27)	26	(25–27)	**1**	137	2%
	Later	23	(21–25)	27	(26–28)	32	(31–34)	**5**	100	25%
1983–1990	Earlier	20	(19–23)	27	(25–29)	23	(21–24)	**−4**	45	0%
	According to plan	24	(24–25)	26	(25–27)	26	(26–27)	**0**	132	17%
	Later	25	(24–25)	27	(26–28)	NA	(32–NA)	**>5**	214	71%

fertility timing gap of just 2 years, whereas the fertility timing gap for women in the 1971–1976 and 1977–1982 cohorts was determined at 5 years. The median age at childbirth for the youngest group of women cannot yet be determined since more than half of these women have not yet had a first child (however, all these women have reached the age at which they planned their first child, and they have not revised their plans). Nevertheless, based on the confidence interval of the median values of the real age at childbirth, the fertility timing gap for this group will be at least five years (Table 3).

Individual fertility timing gap factors

Those who subjectively perceived the later birth of their first child than originally planned were asked to make a subjective assessment of the factors that led to the delay in first childbirth. The survey questionnaire battery contained 11 statements and the option 'other'. The respondents were invited to rate the statements on a scale of 1 (completely unimportant) to 4 (very important). The results revealed that the most important delayed childbirth factor concerned the absence of a

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Table 4. Reasons for later childbirth and reduction of factors

Statement	Mean	CI mean	Factor1	Factor2	Factor3	Factor4
I did not have a suitable partner	2.36	(2.23–2.49)		0.134	0.848	−0.125
It took longer to get pregnant	2.16	(2.04–2.29)			−0.165	0.707
Lack of money	2.10	(1.99–2.21)	0.301	0.761		
My or my partner's health	2.02	(1.90–2.14)				0.668
Unsuitable housing situation	1.97	(1.86–2.08)	0.202	0.826		
My work and professional activities	1.87	(1.77–1.97)	0.894	0.184		
Broke up with/divorced my partner	1.86	(1.74–1.98)	0.113		0.676	
I was a student	1.85	(1.75–1.96)	0.713	0.204		
Concerns about unemployment/loss of position	1.84	(1.74–1.94)	0.598	0.462		
My partner wished to have children later	1.72	(1.63–1.82)	0.207	0.254	0.146	
My interests	1.42	(1.34–1.49)	0.341	0.347	0.111	
Other	1.35	(1.27–1.44)	0.172			
			Career	**Material**	**Partner**	**Health**
Factors score minimum			−1.280	−1.663	−1.260	−1.064
Factors score maximum			2.253	2.164	1.587	1.802

Note: Only those women who declared the later-than-planned birth of the first child ($N = 425$). Principal component analysis: 46% of the initial variation in the statements was explained by four factors, varimax rotation, only those loadings greater than +/− 0.1 are presented.

suitable partner (Table 4; mean importance 2.36), followed by difficulties in becoming pregnant (2.16), a lack of financial resources (2.10), and the health of one of the partners (2.02). Since many of the statements correlated significantly, they were reduced to just four variables, i.e. career, material, partner, and health factors, for further analytical use applying the principal component analysis method. The loading of each statement in terms of these factors is shown in Table 4.

The following models assessed the individual length of the fertility timing gap for women who declared a later birth than planned. Concerning the women who declared a later birth, the fertility timing gap ranged from 0 to −19 years for women with children and 0 to −27 years for childless women (Table 5). The median value for each group presented in Table 5 is −3 years.

The length of the fertility timing gap was subsequently entered into the models as the dependent variable for the four subjectively evaluated postponement factors (a positive factor score indicated that the factor played a very important role). Models M1 to M3 (Table 6) include all those women ($N = 425$) who declared a later-than-planned childbirth and who have already exceeded the planned age, while models M4 to M6 (Table 6) include only those women who have already had their first child ($N = 238$).

When only the four subjectively evaluated factors were entered into the model as explanatory variables (M1 and M4), the partner factor contributed most significantly to the fertility timing gap for both populations and each unit increase in the factor score acted to widen the fertility timing gap by more than one year (M1 = −1.13; M4 = −1.24); moreover, with the increase in the importance of the health factor, the fertility timing gap widened by approximately half a year (M1 = −0.49; M4 = −0.64).

The other models included additional control variables. Models M2 and M5 included age as the control variable for the cohort changes in fertility timing, and models M3 and M6 included age and the current number of children at the time of data collection as the retrospective bias control

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Table 5. Individual fertility timing gap

Fertility timing gap	Total *N*	Women with children *N*	Childless women *N*
0	38	10	28
−1	75	50	25
−2	85	50	35
−3	71	38	33
−4	51	31	20
−5	29	18	11
−6	20	13	7
−7	16	10	6
−8 to −11	25	13	12
−12 to −15	6	4	2
−16 to −19	6	1	5
−25 to −27	3		3
N	425	238	187

variables based on the current life stage of the woman during which she evaluated the timing of the first childbirth. The partner effect remained significant (M2 = −1.17; M5 = −1.22) even when we included the age of the respondent at the time of the survey in the model so as to account for potential cohort changes in the fertility timing gap. Interestingly, with concern to model M2, the effect of the health factor weakened by almost half (−0.26) and, in contrast, the career factor contributed significantly to the fertility timing gap (−0.43). The role of the health factor persisted for model M5 (M5 = −0.59). The final models, M3 and M6, extended the research by including the respondents' current number of children. The partner factor remained significant for all the women as well as for mothers (M3 = −0.87; M6 = −1.15), and the health factor maintained its significance for the mothers (M6 = −0.55). Moreover, the inclusion of the control variables in the model revealed the significant contribution of the career factor to the fertility timing gap (M2 = −0.43; M3 = −0.31) for all the women. Concerning the mothers, the material factor led to the prolongation of the fertility timing gap when both the control factors were included (M6 = −0.33).

Concluding discussion

In addition to the fertility gap, which has already been extensively considered in the literature, and which indicates the difference between the desired or intended number of children and the actual observed number of children, we introduced a variation on this theme – the fertility timing gap – as demonstrated via the example of the timing of the first childbirth. The fertility timing gap is measured as the difference between the median age at the birth of the first child and the median age at which the birth of the first child was planned. Across several generations of Czech women, the oldest cohort (1966–1970), which still largely followed the early fertility pattern (Kocourková *et al.*, 2022), was found to have a fertility timing gap of minus one, i.e. the planned age at the birth of the first child was higher than that observed (planned age = 23 years; actual age at first childbirth = 22 years). However, women in the youngest cohort (1983–1990) were observed to have a fertility timing gap of plus two years (planned age = 27 years; actual age = 29 years).

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Table 6. The length of the individual fertility timing gap for the first childbirth depending on the related factors and the control variables (age of the women and current number of children)

	ALL WOMEN														
	M1					M2					M3				
	Estimate	Std. error	*t* value	Pr(>|*t*|)		Estimate	Std. error	*t* value	Pr(>|*t*|)		Estimate	Std. error	*t* value	Pr(>|*t*|)	
Intercept	−3.63	0.17	−20.93	0.00	***	3.16	0.97	3.27	0.00	**	6.32	1.05	6.04	0.00	***
Career	−0.09	0.19	−0.47	0.64		−0.43	0.19	−2.31	0.02	*	−0.31	0.18	−1.72	0.09	
Material	−0.02	0.20	−0.12	0.91		−0.19	0.19	−1.02	0.31		−0.12	0.18	−0.65	0.52	
Partner	−1.13	0.20	−5.77	0.00	***	−1.17	0.19	−6.27	0.00	***	−0.87	0.18	−4.74	0.00	***
Health	−0.49	0.21	−2.30	0.02	*	−0.26	0.21	−1.28	0.20		−0.20	0.20	−1.00	0.32	
Age						−0.19	0.03	−7.11	0.00	***	−0.32	0.03	−9.84	0.00	***
Current number of children											1.48	0.23	6.46	0.00	***
–															
Adjusted *R*-squared				**0.0730**					**0.1709**					**0.2443**	
N				425					425					425	

	MOTHERS														
	M4					M5					M6				
	Estimate	Std. error	*t* value	Pr(>|*t*|)		Estimate	Std. error	*t* value	Pr(>|*t*|)		Estimate	Std. error	*t* value	Pr(>|*t*|)	
Intercept	−3.69	0.18	−20.35	0.00	***	−2.43	1.16	−2.11	0.04	*	−2.33	1.15	−2.04	0.04	*
Career	−0.11	0.21	−0.51	0.61		−0.17	0.21	−0.77	0.44		−0.17	0.21	−0.82	0.41	
Material	−0.29	0.20	−1.45	0.15		−0.30	0.20	−1.49	0.14		−0.33	0.20	−1.67	0.10	
Partner	−1.24	0.19	−6.35	0.00	***	−1.22	0.20	−6.27	0.00	***	−1.15	0.20	−5.88	0.00	***
Health	−0.64	0.21	−3.01	0.00	**	−0.59	0.22	−2.73	0.01	**	−0.55	0.21	−2.56	0.01	*
Age						−0.03	0.03	−1.10	0.27		−0.06	0.03	−1.94	0.05	
Current number of children											0.67	0.30	2.26	0.02	*
Adjusted *R*-squared				**0.1682**					**0.1689**					**0.1830**	
N				238					238					238	

These women represent the new (late) reproductive regime and spent significantly longer periods in education than their older counterparts (the median age at achieving the highest level of education was 19 years for the 1966–1970 cohort and 24 years for the 1983–1990 cohort). Thus, the fertility timing gap across the cohort groups is consistent with existing knowledge on the effect of the extension of the period of education on the timing of fertility (Ní Bhrolcháin and Beaujouan, 2012; Barro and Lee, 2013; Neels *et al.*, 2017). Therefore, following the reasoning advanced for the United States (Guzzo and Hayford, 2023), it can also be argued for Czechia that the worsening of economic conditions after 2008, at which time most of the 1983–1990 cohort realised their reproductive plans, contributed to delayed fertility. Moreover, the increase in the availability of contraceptives (Kocourková and Fait, 2011), which serves to prevent earlier-than-planned conception, also contributed to the transformation of the fertility timing gap across the cohorts.

The women in the sample were divided into three groups based on the subjective assessment of the timing of the first childbirth: women who had their first child according to plan (43%), women who had their first child earlier than planned (16%), and women who declared that their first child was born later than planned (41%). The latter group of women was represented differentially across the four observed generational groups, with the smallest proportion in the oldest group of women (the 1966–1970 cohort), who exhibited the shortest fertility timing gap (2 years difference, planned age = 24 years, actual age = 26 years). The fertility timing gap was as high as 5 years for the other cohorts, and it is possible that it will be even longer for the youngest group of women surveyed (the 1983–1990 cohort).

We subsequently assessed the individual length of the fertility timing gap and the subjectively declared associated factors for the women who declared that their first child was born later than planned. Firstly, four potential groups of related factors were identified via the principal component analysis approach: career, material, partner and health. In addition to these four factors, the final model, which served to determine the length of the individual fertility timing gap, included the woman's age at the time of the survey (in order to address the cohort effects) and the current number of children (so as to reflect different life course stages and the differing retrospective bias) as control variables.

The career factor acted to extend the fertility gap for all the women in the models that included the control variables, which can be understood to indicate that career (and study) ambitions are only relevant for the delaying of first childbirth during a certain life stage. When only the mothers (the women who had already had their first child) were subjected to analysis, the career factor was observed to be insignificant. The relatively weak and, in the case of already realised fertility, insignificant influence of the career factor, which includes periods of study, can be explained by the fact that the women's career ambitions were already included in the determination of the planned age. In addition, the influence of changing norms (Lesthaeghe and Surkyn, 1988; Van de Kaa, 1997; Lesthaeghe, 2010) and economic uncertainty (Kohler *et al.*, 2002; Billingsley, 2010) frequently described in the literature as causes of fertility postponement are not related to the actual age but to the planned age at first childbirth.

The unplanned component of later fertility – the fertility timing gap – is associated principally with partner-related and health factors; moreover, the latter does not exclude the fact that health issues may, at least partly, be the consequence of later family planning. However, according to previous findings, this factor comprises the final step in the fertility delay trajectory (Slabá *et al.*, 2021). Thus, it is possible that childless women who were included in the extended model, in which health factors did not play a significant role, may not yet have reached this stage of fertility delay.

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Ethical standard. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

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