DEMOGRAPHIC RESEARCH
A peer-reviewed, open-access journal of population sciences

DEMOGRAPHIC RESEARCH

VOLUME 53, ARTICLE 37, PAGES 1173–1206
PUBLISHED 11 DECEMBER 2025
https://www.demographic-research.org/Volumes/Vol53/37
DOI: 10.4054/DemRes.2025.53.37

Research Material

First reproductive experience: A survey module

Eva Beaujouan
Shalini Singh
Anna Šťastná
Martin Kreidl
Daniel Dvořák
Barbora Hubatková
Darina Kmentova
Jitka Slabá
Jasmin Passet-Wittig
Alice Goisis
Heini Väisänen

Contents

Demographic Research: Volume 53, Article 37
Research Material

First reproductive experience: A survey module

Eva Beaujouan[1]
Shalini Singh[2]
Anna Šťastná[3]
Martin Kreidl[4]
Daniel Dvořák[5]
Barbora Hubatková[6]
Darina Kmentova[7]
Jitka Slabá[8]
Jasmin Passet-Wittig[9]
Alice Goisis[10]
Heini Väisänen[11]

Abstract

BACKGROUND
The first reproductive experience, particularly its timing, shapes reproductive pathways and the number of children a person has. However, most surveys that record childbearing histories do not ask about this formative initial experience.

OBJECTIVE
This questionnaire module on first reproductive experiences aims to improve the understanding of women's and men's reproductive pathways by capturing the timing, sequence, and outcomes of the first attempt to conceive or the first unplanned pregnancy.

METHODS
The module was developed through conceptual design, cognitive testing, and pilot implementation in the Czech Generations and Gender Survey (GGS-II. Wave 2). It collects data on age at first pregnancy attempt or first unplanned pregnancy, duration until

[1] University of Vienna (Wittgenstein Centre), Austria. Email: eva.beaujouan@univie.ac.at.
[2] University of Vienna (Wittgenstein Centre), Austria. Email: Shalini.singh@univie.ac.at.
[3] Charles University, Prague, Czechia. Email: anna.stastna@natur.cuni.cz.
[4] Masaryk University, Brno, Czechia. Email: kreidlm@fss.muni.cz.
[5] Masaryk University, Brno, Czechia. Email: 462749@mail.muni.cz.
[6] Masaryk University, Brno, Czechia. Email: 220208@mail.muni.cz.
[7] Masaryk University, Brno, Czechia. Email: 483778@mail.muni.cz.
[8] Charles University, Prague, Czechia. Email: jitka.slaba@natur.cuni.cz.
[9] Bundesinstitut für Bevölkerungsforschung (BiB), Wiesbaden, Germany. Email: jasmin.passet@bib.bund.de.
[10] University College London, UK. Email: a.goisis@ucl.ac.uk.
[11] Institut national d'études démographiques (INED), France. Email: heini.vaisanen@ined.fr.

conception or discontinuation of attempts, use of fertility treatments, and outcomes (e.g., abortion, miscarriage, stillbirth, or live birth).

RESULTS
Pilot testing demonstrated clear question comprehension and a smooth response process, even for sensitive items. Missing or 'don't know' responses remained within a reasonable range (2%–10%), indicating the suitability of the module for large-scale surveys.

CONTRIBUTION
This novel instrument addresses critical gaps in fertility research by improving our understanding of contemporary reproductive experiences. By documenting the age and timing of events, it helps to (1) quantify reproductive difficulties and successes by age, (2) calculate Time to Pregnancy (TTP) and to live birth in the general population in an inclusive and accurate way, (3) link the first reproductive experience to broader life course factors. Integrating this module into demographic and family surveys allows building a bridge between reproductive health and demographic research.

1. Motivation to investigate the first reproductive experience

As individuals age, their biological ability to conceive diminishes (Leridon 2004; van Noord-Zaadstra et al. 1991; Wood 1989). In contemporary Europe and in an increasing number of world regions, first births have been postponed considerably in recent decades, leading to an increased likelihood of individuals remaining childless or having fewer children than intended (Beaujouan 2023; Bratti and Tatsiramos 2012; Pardo et al. 2025; Raymo et al. 2015; Rybińska and Morgan 2019). Moreover, the gap between when individuals intend to become parents and when they actually do so has been widening (Slabá, Kocourková, and Šťastná 2024), arguably indicating an (un)intentional shift towards later fertility (Singh 2024). The risk of experiencing pregnancy-related difficulties – including infertility, miscarriage, foetal chromosomal abnormalities, and preterm births – increases with age, which may act as a barrier to realising fertility intentions (Balasch 2010; de La Rochebrochard et al. 2006; du Fossé et al. 2020; Frederiksen et al. 2018; Schmidt et al. 2012). Furthermore, specific events, such as miscarriage and pregnancy complications, have been shown to increase the risk of future miscarriage (Magnus et al. 2019). Finally, reproductive experiences tend to affect physical and mental well-being and personal life circumstances (Gravensteen et al. 2018; Lewinsohn et al. 2018; Luk and Loke 2015; McCarthy and Chiu 2011; Quenby et al. 2021).

For these reasons, it is essential to improve our understanding of the timing of the first reproductive experience and its link to subsequent life events and behaviours. Yet,

major fertility surveys do not routinely collect information on the age at which people attempt to have their first child. Similarly, they do not inquire into ensuing events (and their timing), such as the time taken to become pregnant (or the time taken to stop trying), whether a live birth occurred on that occasion, or the reasons behind the decision to stop trying to conceive.

The survey module we describe in this article aims to provide a deeper and more robust understanding of the factors associated with men's and women's first reproductive experience, notably their first attempt to conceive (or their first unplanned pregnancy), and how it unfolds. The module covers the timing of events/decisions, their outcomes (e.g., pregnancy, continued efforts to conceive, or discontinuation of efforts in case of an attempt to conceive; e.g., live birth, induced abortion, miscarriage, stillbirth in the case of a pregnancy), the problems people faced (such as difficulty to conceive, financial or housing constraints that led to discontinuation), and resources they used (such as infertility treatment methods).

2. Why reproductive timing matters

Demographic research has often used the age of 15 as a convenient numerical benchmark for the start of the reproductive window. As individuals have greater control over their family planning and tend to start having children later in life, this approach has become conceptually and empirically obsolete. Researchers need a more accurate, conceptually sound, and empirically validated threshold. Conceptually, the start of the reproductive window means either the first time someone tries to conceive (whether or not this results in a live birth) or a pregnancy without a planned attempt. This first reproductive experience is central to the entire reproductive journey (Guzzo and Hayford 2011; Trussell and Menken 1978). It not only defines the unique starting point of individuals' reproductive trajectories, but it is also closely linked to their later-life decisions and outcomes, such as reproductive desires, reproductive and mental health, partnership dynamics, marriage, and ultimately, the number of children people have (Beringer and Milewski 2024; Guzzo and Hayford 2014; Habbema et al. 2015; Henretta et al. 2008; Hogue 1986; Mirowsky 2002; Morgan and Rindfuss 1999).

Time to pregnancy (TTP) – the number of non-contracepting menstrual cycles required to conceive (Baird, Wilcox, and Weinberg 1986) – is a widely used measure in clinical studies to estimate infertility. However, TTP – as presently measured – often provides only partial information. In specific clinical contexts, it often narrowly focuses on the success of assisted reproductive technologies (ART). In some other research contexts, its value is diminished by inconsistent handling of unsuccessful conception attempts across studies (Hong et al. 2022; Sunkara et al. 2020). The data provided by this

module on first reproductive experience will enable the calculation of a more comprehensive measure (outside the clinical set up) that answers a crucial question: How long does it take for a person to have their first child (or achieve a pregnancy that results in a live birth) when they begin trying at a given age, and what are their chances of success?

Our clock starts at the respondent's first attempt to conceive and ends with a well-defined outcome – for instance, a pregnancy, a birth, or no pregnancy by the time the individual stops trying to conceive. By explicitly capturing the duration of the attempt, our approach includes individuals who have never conceived, making the measure both inclusive and highly informative. This measure provides an accurate estimation of age-specific TTP and fecundability. It enhances our understanding of socioeconomic variations in time to pregnancy and to live birth. It also helps to refine models of age-related fertility decline, including the decline in the occurrence rate of pregnancy or birth with age. This makes a significant contribution to the field of human reproduction research, where data on age-related fecundability patterns remains limited (Eijkemans et al. 2014; Leridon 2008).

3. New research questions arising from this module

This module is designed for inclusion in nationally representative family surveys. It enriches the study of contemporary life experiences by reaffirming reproduction as a fundamental aspect of the life course. Collecting retrospective data on the first attempt to conceive or an unplanned pregnancy enables researchers to answer a variety of questions. For example, it helps us understand how the age of men and women at the time of their first reproductive experience and the circumstances surrounding it relate to their subsequent behaviour in areas such as partnership formation and dissolution, mental health, and family size. It also enables the identification of broader population-level patterns. For example, the module helps quantify the extent to which delaying the first attempt to have children results in subfertility and unmet fertility goals, which can influence broader demographic trends.

The first experience provides a clear, measurable starting point that can inform longitudinal analyses of reproductive life courses. Tracking the sequence of key reproductive events allows success rates and time to pregnancy or to first live birth to be estimated based on age at first attempt. In the 1980s, having a first child after age 35 was relatively rare, as most women became mothers in their 20s (Nathan and Pardo 2019). As a result, comparing reproductive indicators by age was less meaningful due to limited variation and to more selection at older ages. Today, however, the age at first birth is more widely distributed, with the modal age now around 28 to 32 in many high-income

countries (Nathan and Pardo 2019). This shift reduces the impact of selection at older reproductive ages, making age-based comparisons more insightful and relevant.

Incorporating these questions into major fertility surveys will generate pioneering research in several ways. For the first time, both women and men will be asked about their first reproductive experience. Collecting data from both genders is essential for investigating whether and how gender is associated with differences in the perception, memory, and action surrounding the timing and outcomes of first reproductive experiences. This will help to address the longstanding gap in fertility research, which often overlooks men, despite them being active participants in reproductive decision-making and outcomes (Dudel, Cheng, and Klüsener 2023). This additional data will enable us to calculate gender-specific estimates of reproductive parameters (e.g., fecundability, pregnancy chances, and outcomes) and pathways (e.g., use of assisted reproduction, unintended parenthood), while also enhancing our understanding of data quality in men's reproductive reporting (Dunson, Baird, and Colombo 2004; Joyner et al. 2012; Keizer, Dykstra, and Jansen 2008).

In surveys where data from both partners is available (the HILDA panel survey in Australia, for instance), this module would enable couple-level (dyadic) analysis, notably revealing whether the first reproductive experience was shared with the current partner or occurred with a previous one. It would also provide valuable insight into gendered interpretations of the same event for couples who tried to conceive for the first time together, particularly with regard to how individuals recall and make sense of early reproductive events (Lazzari, Gray, and Baffour 2022; McQuillan et al. 2021).

In addition, the proportion of childless men and women is rising rapidly in many world areas (Beaujouan and Neels 2025; Jalovaara et al. 2019; Lima, Zeman, and Sobotka 2018). Surveys currently contain very little information on the trajectories of people who do not have children and whether/when they experience reproductive difficulties. Though childlessness and its diverse pathways are being increasingly studied in high-income countries, childlessness caused by infertility is also a common yet understudied phenomenon in many low-income settings, particularly in Sub-Saharan Africa (Oyuyo 2024; Van Gorkom 2021). Incorporating this module in such contexts would not only draw attention to this important phenomenon but also provide a meaningful starting point for tracing reproductive trajectories and understanding better how they may lead to infertility and eventual childlessness. This module provides a unique opportunity to capture key reproductive events, difficulties conceiving naturally, and the use of fertility treatments, as well as adverse pregnancy outcomes. The methodological advances in measuring TTP, as detailed above, allow us to compare the odds of failing to conceive or the odds of achieving a live birth based on the age at first attempt and socioeconomic characteristics.

Although this module focuses specifically on the first reproductive experience, subsequent attempts to conceive, such as trying for a second or subsequent child, are also important for understanding cumulative fertility and life course outcomes. The current, self-contained version of the module could also form the basis for future expansions. For instance, it could include questions about subsequent or most recent attempts. This would provide a life course perspective on reproductive experiences, capturing changes over time and across parities.

4. The survey module as implemented in the Czech Generations and Gender Survey (GGS-II. Wave 2)

Our survey module, as implemented in the Czech Generations and Gender Survey II (GGS-II), is presented in the Appendix. It is entirely original and was developed in response to the gaps in the current research on human reproduction and fertility. Avoiding a complex research design, it focuses solely on the first reproductive experience, asking about it in a simple and targeted way. The module is designed to be inclusive and can be administered to any respondent. Men and women of any age, whether in a relationship or not, may have experienced difficulty conceiving, an unplanned pregnancy, or an abortion. In order to provide a sufficient sample for the study of those with a late first reproductive experience and later life outcomes, it is particularly recommended to administer it to people of all ages, as done in the Czech Republic, and not only to people of reproductive ages at the time of interview. The module covers the essential question of timing of the first attempt (age at first attempt, duration until pregnancy), and offers the possibility of several paths to the outcome (use of ART, etc.) and of several outcomes including live birth, pregnancy loss, and discontinuation of attempts.

We acknowledge that some of these questions can be sensitive for some individuals, which may contribute to higher non-response rates compared to less sensitive topics. Self-administered questionnaires, such as computer-assisted web interviewing (CAWI), offer a greater sense of privacy, making them particularly well suited to these types of questions. However, it is unclear whether they allow respondents to comprehend the questions sufficiently well to produce valid responses. To address these concerns and ensure good comprehension of the questions, the initial version of the survey module (online supplementary material 1) was subject to cognitive testing in the Czech Republic. This assessment confirmed a generally positive reception to the questions, with no major difficulties in discussing unplanned pregnancy, infertility, use of infertility treatments or abortion. The full report from these cognitive interviews is available in online supplementary material 1. It explains refinements (in question wording and interview

structure) that were implemented to enhance clarity and account for cognitive response factors.

Following these adjustments, the revised questionnaire was tested in a pilot study that relied mostly on the CAWI mode of interviewing (CAPI was utilized for 10 pilot respondents). The pilot was carried out by the Czech team in two steps, the second one following some format and programming corrections. The results of the pilot testing are available in online supplementary material 2. In addition to the percentage distribution of responses for each question, we provide a table with descriptive statistics on response times, returns to items ('backward clicking'), and deletions/edits of previously provided responses. They are good indicators of sensitivity (e.g., respondents taking longer to consider whether and how to respond), of potential misunderstanding and/or high cognitive burden (e.g., respondents needing to check their previous response, or respondents differently understanding a question after the context is revealed through subsequent questions). Due to technical issues in the filter for the last two questions on unplanned pregnancy (age –b8repr08_2801, and outcome – b8repr09_2801), which have since been corrected for the actual survey, results for these items are not available. Other than that, the results were consistent and the indicators confirm that respondents understood the questions without significant difficulty.

On items presented to at least 100 pilot respondents, the share of respondents who chose the 'don't know' response was low, varying between 0% (result of the pregnancy, see Table 7a in the online supplementary material 2) and 7% (age at first attempt to conceive, see Table 1a in the online supplementary material 2). The share of respondents that chose the 'I don't want to tell' response varied between 0% (result of the pregnancy, see Table 7a in the online supplementary material 2) and 3% (3 items: age at first attempt to conceive, outcome of the first attempt to conceive, experience of unplanned pregnancy; see Tables 1a, 2a, and 8a in the online supplementary material 2, respectively). Similarly (again looking only at items that were presented to at least 100 respondents and disregarding items on duration questions, the format of which was corrected based on the pilot), the share of respondents who went back to a particular question was between 0.8% (infertility treatment methods, see Table 3b in the online supplementary material 2) and 3.7% (experience of unplanned pregnancy, see Table 8b in the online supplementary material 2). The share of respondents who edited a previously provided answer was between 0% (2 items: outcome of the first attempt to conceive, pregnancy result, see Tables 2b and 7b in the online supplementary material 2, respectively) and 2.1% (experience of unplanned pregnancy, see Table 8b in the online supplementary material 2). The final pilot-tested questionnaire also served as the version implemented in the Czech GGS-II survey (after the filter corrections of the last two questions) as Wave 2 of Round 2. The full, final questionnaire is shown in the Appendix. The resulting database

is to be released at the beginning of 2026 via the GGP archive and under the usual data access policy.

5. Existing survey instruments measuring reproductive experiences and added value of this new module

Standard demographic surveys provide information on live births, but live births hardly represent the full range of reproductive experiences. The understanding of a wider range of reproductive events is often limited to surveys that are not representative of the population (people visiting hospitals, family planning centres, or fertility clinics, etc.) (Chambers et al. 2017; Dunson, Baird, and Colombo 2004). Only a few population-based surveys have attempted to collect more detailed reproductive information in the high-income countries: the French FECOND Survey (2010), the Spanish Fertility Survey (2018), the Polish GGS-I (longitudinal 2011 and 2014), the American National Survey of Fertility Barriers (NSFB, longitudinal 2004 and 2010), the National Survey of Family Growth (NSFG, cross-sectional since 1973), and the National Longitudinal Survey of Youth 1979 (NLSY79, longitudinal since 1979). While each offers valuable insights, important gaps remain.

The French FECOND survey tries to capture all women's reproductive attempts, but the complexity of the questionnaire and survey fatigue seem to have led to data quality problems (Scott et al. 2019). Although the Spanish Fertility Survey contains many questions on reproduction, it lacks information on the age at which men and women first tried to conceive a child, which is the starting point of measures such as TTP. The addition of a small set of questions to the Polish GGS-I allows the calculation of the TTP among women who have experienced a first birth, but does not investigate those who never become pregnant or experience a pregnancy loss (Tymicki 2017). The NSFB interviewed 4,712 women, but only up to age 45, which limits the sample size for the exploration of the life-long consequences of the first reproductive experience (such as childlessness). Both the NSFG and NLSY79 include detailed retrospective reproductive information, including unintended pregnancies and fertility-related behaviours, yet neither captures the full context of a person's very first attempt to conceive – such as age at first attempt, TTP, reasons for discontinuation, or whether assistance was sought.

The German panel survey FReDA (Family Research and Demographic Analysis) and the GGS-II are examples of important population-level surveys that collect complete fertility and partnership histories, but have restricted information on reproductive experiences. In FReDA, the existing question on infertility is 'Have you ever tried to have a child with a partner, but pregnancy has not occurred within at least 12 months?'. In GGS-II Waves 1 and 2, it is 'Was there ever a time when you and a partner were trying

to get pregnant but did not conceive within at least 12 months?'. They are not accompanied by a question on the age of the individual at the time of trying. Hence, these essential fertility surveys lack the information needed to understand the sequence of events, and notably whether these people used assisted reproduction following that episode, whether the infertility episode happened before or after the known births of the respondent, etc. Most importantly, the experience of infertility cannot be linked to the age at which the person started trying to have a child, an aspect that is increasingly important to investigate, given the sustained patterns of childbearing postponement in high-income countries.

In low- and middle-income countries, most Demographic and Health Surveys (DHS) collect full birth histories but do not ask about the first reproductive experience and are not usually designed to study issues related to achieving pregnancy, the full range of pregnancy outcomes, and infertility (Fledderjohann and Roberts 2018; Väisänen and Batyra 2022). From Wave 8 onwards (conducted between 2018 and 2025), full pregnancy histories were collected, including those that do not result in live births, alongside information about their outcomes (e.g., miscarriage, abortion, or stillbirth). While this provides information on the timing and outcome of the first pregnancy, the questions are not equivalent to those in our proposed module, which focuses on the attempt to conceive rather than the pregnancy itself. Questions about the intendedness of pregnancies were expanded the same way in Wave 8. The answer categories include whether the pregnancy was wanted, mistimed (occurring too early), or unwanted. However, we do not know whether respondents would have preferred the pregnancy to occur earlier or what prevented this from happening (e.g., lack of a partner or fertility issues). There are also no questions about TTP, problems with conceiving, or fertility treatments. Therefore, the use of DHS for studying potential infertility issues remains limited.

In conclusion, when asked in the context of larger, representative, cross-sectional or panel surveys, the proposed set of questions can uniquely enrich the research agenda on reproduction among women and men, particularly those who experience infertility/subfertility when trying to conceive for the first time. Notably, this approach enables us to link the initial reproductive experience and its timing with various factors observed during the survey, including well-being, fertility intentions, childlessness, completed fertility, and later-life outcomes. It can complement and enrich a panel survey (such as FreDA) but it can also complement retrospective questions on partnership and fertility history and current reproductive experiences as asked in some cross-sectional surveys. For instance, in the GGS it is possible to link the timing of first reproductive experiences to specific relationships respondents may have had at that point in time. In this way, the relationship context of first reproductive experiences can still be analysed without necessarily including additional direct questions in the module itself. In several cited surveys, questions on reproductive experiences with the current partner would

complement our module by providing additional information on recent contraceptive use and experiences of assisted reproduction. In longitudinal surveys, subsequent waves of data collected alongside this combined information make it possible to explore future life pathways (e.g., birth, separation, and variation in fertility intentions).

6. Methodological considerations: Limitations and plans for validation

6.1 Potential sources of bias in the module

While the module offers a novel and much-needed lens into the first reproductive experience, it is important to acknowledge the inherent limitations of retrospective data collection. Like other retrospective surveys, it is vulnerable to various types of non-sampling error, particularly frame error, unit non-response, and measurement error (Weisberg Herbert 2005). Frame error arises when the current survey sampling frame does not fully represent the historical population of interest, which may occur due to mortality, selective migration, or changes in institutionalisation (Kreyenfeld, Hornung, and Kubisch 2013; Murphy 2009; Tymicki 2010). This can lead to under-coverage of individuals who are more mobile, experience health complications, or have left the country. Similarly, unit non-response is often unevenly distributed across demographic groups, reflecting the difficulty in contacting specific individuals or households. For instance, childless individuals and older or divorced men are frequently under-represented in demographic surveys, while mothers of young children or rural residents are over-represented (Festy and Prioux 2002; Groves et al. 2009; Rendall et al. 1999; Tymicki 2010). Such imbalances can compromise the generalizability and validity of survey-based estimates.

Measurement error is another major concern and may stem from memory failure (i.e., recall bias) or intentional misreporting (Beckett et al. 2001; Gaskell, Wright, and O'Muircheartaigh 2000). Respondents may misremember or misdate events, particularly if they occurred many years ago (Dex 1995; Mathiowetz and Ouncan 1988). Well-documented issues in retrospective surveys include telescoping (placing events closer to the present than they actually occurred) and post-rationalisation (reinterpreting past events or intentions based on current feelings or circumstances) (Behrens and Del Mistro 2008; Gaskell, Wright, and O'Muircheartaigh 2000; Müggenburg 2021). These biases can affect responses related to the age at first attempt to conceive, the duration of attempts, reasons for discontinuing, and resulting outcomes. While cognitive testing of this survey module showed good comprehension, the salience and emotional weight of reproductive events may vary significantly across individuals, leading to deliberate or

unconscious omission of sensitive experiences such as abortion, miscarriage, infertility, or the use of ART.

Infertility is subject to several layers of under-reporting in surveys. While many people say they know someone who has experienced infertility, general awareness of what infertility actually means, how common it is, and what risk factors contribute to it remains limited (Adashi et al. 2000). This lack of understanding can prevent individuals from recognising their own struggles as infertility, leading to omissions or misclassification in surveys. Social stigma further complicates disclosure. Infertility is often seen as a private or sensitive matter, and many individuals may feel uncomfortable acknowledging it. This reluctance may be especially pronounced among men, who are generally less likely to speak openly about reproductive concerns and to seek medical help (Anderson et al. 2009; Slauson-Blevins and Johnson 2016). As a result, gendered patterns in reporting may arise, contributing to measurement bias.

As documented in previous studies, abortions are particularly prone to under-reporting. Reporting rates vary between 25% and 86% across various surveys and countries (Lindberg and Scott 2018; Scott et al. 2019; Tennekoon 2017). Some induced abortions may be reported as spontaneous, particularly where abortion is not socially accepted (Casterline 1989), which blurs the distinction between these two pregnancy outcomes. Few studies have examined miscarriage reporting, but the available evidence suggests that, while underreporting in surveys is likely, it may be less prevalent than for abortions (Bardos et al. 2015; Bommaraju et al. 2016; Casterline 1989; Lindberg and Scott 2018; Yan and Tourangeau 2022). For example, a recent French study estimates a 92% reporting rate for miscarriage (Compans and Väisänen 2025). A study in the United States suggests minimal recall bias for miscarriage (Lang and Nuevo-Chiquero 2012), indicating that some reproductive experiences may be more robustly reported than others.

These challenges extend to fertility treatments as well. In the United States, for instance, discrepancies between birth certificate data and the National ART Surveillance System (NASS) suggest that many births resulting from ART are not fully captured in official records (Cohen et al. 2014; Thoma et al. 2014). Reporting issues also extends to Medically Assisted Reproduction (MAR), a broader category that includes ART alongside other interventions such as hormonal therapies and intrauterine insemination. MAR use may be underreported. For example, a study among mothers in Italy finds indices of underreporting, possibly due to prevailing social norms that are less accepting of non-conventional paths to parenthood (Burgio et al. 2025). At the same time, MAR's success may be overestimated if couples who undergo treatment eventually conceive spontaneously (de La Rochebrochard et al. 2009; Troude et al. 2012). These patterns likely vary across countries depending on attitudes, personal comfort with disclosure, and survey design.

Finally, while the module is designed to complement life histories collected in surveys such as the GGS or FReDA, its validity depends on respondents' ability to situate discrete reproductive events on a timeline, which may vary by age group and context. A lack of awareness of some pregnancies that end in early miscarriages can result in additional biases, particularly marked in case of unplanned pregnancies and among socioeconomically disadvantaged groups (Strong et al. 2023; Watson and Angelotta 2022).

6.2 Conceptual challenges

In addition to technical sources of error, important conceptual challenges arose in the design of this module. One of these relates to whether the approach to asking about pregnancies covers the full spectrum of intendedness. Reproductive decision-making does not always fit neatly into binary constructs. Research shows that pregnancy orientations exist along a spectrum of intentions, ambivalence, and acceptance (Aiken et al. 2016; Barrett and Wellings 2002; McQuillan, Greil, and Shreffler 2011). The interpretation of intendedness can vary between individuals and contexts, thereby reducing measurement consistency. In the module, respondents are asked to report their first attempt to conceive as well as whether they ever conceived a child without actively trying. This allows us to avoid making a purely binary distinction between intended and unintended pregnancies. According to insights from cognitive testing, respondents do not understand pregnancies resulting from 'letting it happen' or 'being hopeful but not trying' as actively trying to conceive. Rather, they understand these pregnancies as an intermediate state – somewhere between actively attempting to conceive and not making efforts to do so. In such cases, respondents would tend not to report the onset of trying to conceive in Q1. Therefore, pregnancies that occur without a conscious intention to conceive – whether due to limited information, lack of awareness of the consequences, or because planning for children is not a salient topic and events unfold naturally – may be more likely to be reported as occurring without actively trying (Q7–Q9).

Similar challenges arise when respondents are asked to recall and report adverse or emotionally sensitive experiences such as miscarriage, abortion, stillbirth, prolonged attempt to conceive, or fertility treatment. Individuals may resist acknowledging these painful or stigmatised reproductive events as part of their life history, driven by discomfort or a desire to forget, dismiss, or move on (Jackson 2020; Kwesiga et al. 2021, 2023; Tourangeau and Yan 2007). As a result, such experiences may be omitted, downplayed, or reinterpreted in light of current circumstances, a process influenced by social desirability or the psychological need to construct a coherent life narrative. This can blur distinctions between intentional and unintentional events, or between

spontaneous and induced pregnancy losses. Yet for other respondents, the anonymity of surveys can provide a valued space to disclose. Some may even appreciate the opportunity to share these sensitive experiences, allowing such instruments to capture aspects of lived reproductive histories that might otherwise remain hidden (Ong and Weiss 2000).

6.3 Validation strategy and future work

Despite these limitations, the module provides an important foundation for studying the timing and context of first reproductive experiences in large-scale, population-based surveys. To strengthen the module's validity and analytical utility, efforts are underway to explore its consistency and validity using external validation procedures.

Existing demographic studies offer some reassurance that retrospective fertility histories can yield robust and usable data. For instance, fertility and union histories reported in the Family and Fertility Survey (Festy and Prioux 2002) and the GGS (Antunes Leocádio et al. 2023; Vergauwen et al. 2015) have generally compared well with official statistics, with discrepancies mainly limited to the most recent periods and oldest cohorts. Similarly, consistent reporting of birth intervals across major U.S. surveys and birth registration data has been documented, despite some recall issues and the need for imputation in specific datasets (Wu, Martin, and Long 2001). Additional evidence from comparisons across survey waves in the British General Household Survey indicates that the average fertility declared by mothers tends to remain stable over time (Murphy 2009). However, changes to the survey procedure in 1998 resulted in an inaccurate declaration of children (Bhrolcháin, Beaujouan, and Murphy 2011), which highlights the importance of procedure validation for accurate reporting.

Building on this foundation, the Czech GGS team has prioritised validating key variables in the module. The aim is to verify the accuracy of the fertility histories reported in the GGS by comparing reproductive information and childbearing trajectories from the GGS survey data with birth data from national health registers. The Czech Republic maintains high-quality, population-level health registries covering a wide range of reproductive events, such as births, ART, miscarriages, abortions, and stillbirths (Slabá, Šťastná, and Kocourková 2024). By comparing the distributions, timing, and patterns of key reproductive events across these sources, researchers can assess whether the GGS data reflect the known demographic realities and trends observed in the administrative records. Individual-level linkage between GGS respondents and health registers is presently not planned due to legal constraints in the Czech Republic.

Validation is a key part of a broader strategy to increase confidence in the retrospective data, the module, and its long-term analytical potential. To ensure the

applicability of the module for cross-national use, the Czech GGS pilot study intentionally includes adults up to the age of 73, in line with the upper age limits applied in other GGS countries. The module is designed to complement the broader retrospective life course data already collected on adults of all ages. Restricting the module testing to younger respondents would limit its analytical scope and reduce its compatibility with existing GGS structures. Further validation efforts will begin once the full data set has been collected. In particular, it will be possible to compare the ages at which the first reproductive experience occurred and the ages at which children were born. Internal consistency checks will be conducted across items to assess potential age-related recall patterns and inform future improvements.

7. Policy relevance

Goal 5.6 of the 2030 Agenda for Sustainable Development is to "ensure universal access to sexual and reproductive health and reproductive rights". The availability of information on reproductive experiences among women and men is a major necessity in the context of widening inequalities in reproductive health and postponement of childbearing to ages characterised by infertility. As access to care is increasingly liberalised in some countries, it is important to understand the implications for equity in access to reproductive support (Lipson 2001). Many reproductive events, such as infertility, unplanned pregnancies, and pregnancy loss, are not isolated occurrences but are connected over the individual's life course and to other aspects of their life. Women from disadvantaged socioeconomic backgrounds often experience a higher frequency and complexity of these events, leading to a greater cumulative reproductive burden (Johnson et al. 2023). Understanding these patterns can provide valuable insights into reproductive inequalities and inform policies that better support the reproductive health needs of socially and economically disadvantaged groups.

Data on the timing and outcomes of first reproductive experiences should enable policymakers to identify variations in individuals' reproductive trajectories, allowing for more tailored, problem-specific interventions. Such detailed information could inform the development of policies addressing reproductive and sexual health needs in times of delayed fertility. Reproductive issues, especially those occurring early in an individual's reproductive journey, can have far-reaching consequences. Understanding early reproductive events can help shape policies aimed at young people, by improving reproductive health through measures such as fertility education, access to cost-free contraception, and other supportive initiatives. Having data about both women and men enables these questions to be addressed in a gender-balanced way. This could help to develop male-inclusive fertility awareness campaigns (Mertes et al. 2023) and reaffirm

that reproduction is an experience shared by both women and men (United Nations Population Fund (UNFPA) 2025).

Ensuring access to fertility treatments, mental health support, and social services for women and men facing reproductive difficulties – such as pregnancy loss or unsuccessful conception attempts – can help mitigate long-term negative outcomes. Policies that provide equitable, affordable access to ART and fertility counselling are essential for individuals struggling with infertility. At the same time, offering comprehensive information and resources to those who do not wish to conceive supports their reproductive choices and enhances overall sexual and reproductive health and rights.

Furthermore, understanding the relationship between first reproductive experiences and later life outcomes, such as partnership stability and family size, would also guide the design of family-friendly policies. Statistical and demographic models show that postponing childbearing beyond age 35 reduces the likelihood of achieving one's desired family size, and, in particular, increases the likelihood of remaining childless (Beaujouan and Neels 2025; Habbema et al. 2015; Kneale and Joshi 2008). Strengthening this connection with more formal evidence could support policies that promote work–life balance, affordable childcare, and parental leave, while also raising awareness about biological limits and the limited efficiency of assisted reproduction at older ages (Pedro et al. 2018). Balanced measures could potentially encourage individuals to start families earlier, while still supporting those who have delayed parenthood.

By focusing on the timing and nature of the first reproductive event, this module offers valuable insights that can guide policies that respect individual reproductive choices while ensuring positive outcomes for families and society as a whole. The proposed questions are therefore highly relevant for policy development, helping to identify those who may require support and ensuring that existing policies are more equitable and responsive to diverse needs. Hence, we encourage countries conducting surveys that include a section on fertility and family to incorporate this module. Over time, this will enable meaningful international comparisons of the implications of delayed childbearing for individual reproductive trajectories and national fertility trends.

8. Data availability statement and replicability

The proposed Questionnaire is available in the Appendix.

9. Acknowledgments

The contributions of Eva Beaujouan and Shalini Singh were funded by the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant Agreement No 101001410, BIC.Late). The contributions to the cognitive testing, pilot data evaluation, and/or the published text by Anna Šťastná, Martin Kreidl, Daniel Dvořák, Barbora Hubatková, Darina Kmentová, and Jitka Slabá come from the project On our Own: Opportunities and Risks in the Individualization of Society (PRINS) CZ.02.01.01/00/23_025/0008710, which is co-financed by the European Union. The cost of fielding the survey pilot was covered with funds awarded to the large research infrastructure 'Czech national cluster for family research' that is supported by the Ministry of Education, Youth, and Sports of the Czech Republic (proj. num. LM2024074). We would like to thank Martin Bujard for commenting on an earlier version of the module and for rich discussions during a 2024 meeting of the EAPS working group on 'Infertility and Medically Assisted Reproduction'.

Authors' contributions

EB conceived the idea of asking survey questions on reproductive experience, drafted the original module questions, initiated the dissemination of this module by writing submissions to the calls for modules for GGS and FreDA, and edited all drafts of this text. SS drafted all versions of this text, expanding the call for module submissions, and contributed to the development of the module questions. MK initiated the implementation of the module in the Czech Generations and Gender Survey (CZ GGS Round 2, Wave 2). DK conducted the cognitive testing. AŠ, DD, BH, DK, JS, and MK organised and evaluated the pilot survey of different module versions in Czech, refined the questionnaire accordingly, and adopted the final set of questions in the Czech GGS. JP, AG, and HV were part of the initial team that submitted the module proposals and contributed to the project's development through input and revisions.

References

Adashi, E., Cohen, J., Hamberger, L., Jones Jr, H., De Kretser, D., Lunenfeld, B., Rosenwaks, Z., and Van Steirteghem, A. (2000). Public perception on infertility and its treatment: An international survey. The Bertarelli Foundation Scientific Board. *Human Reproduction* 15(2): 330–334. doi:10.1093/humrep/15.2.330.

Aiken, A.R.A., Borrero, S., Callegari, L.S., and Dehlendorf, C. (2016). Rethinking the pregnancy planning paradigm: Unintended conceptions or unrepresentative concepts? *Perspectives on Sexual and Reproductive Health* 48(3): 147–151. doi:10.1363/48e10316.

Anderson, J.E., Farr, S.L., Jamieson, D.J., Warner, L., and Macaluso, M. (2009). Infertility services reported by men in the United States: National survey data. *Fertility and Sterility* 91(6): 2466–2470. doi:10.1016/j.fertnstert.2008.03.022.

Antunes Leocádio, V., Mynarska, M., Gauthier, A., and Costa, R. (2023). The quality of fertility data in the web-based Generations and Gender Survey. *Demographic Research* 49(3): 31–46. doi:10.4054/DemRes.2023.49.3.

Baird, D.D., Wilcox, A.J., and Weinberg, C.R. (1986). Use of time to pregnancy to study environmental exposures. *American Journal of Epidemiology* 124(3): 470–480. doi:10.1093/oxfordjournals.aje.a114417.

Balasch, J. (2010). Ageing and infertility: An overview. *Gynecological Endocrinology* 26(12): 855–860. doi:10.3109/09513590.2010.501889.

Bardos, J., Hercz, D., Friedenthal, J., Missmer, S.A., and Williams, Z. (2015). A national survey on public perceptions of miscarriage. *Obstetrics and Gynecology* 125(6): 1313–1320. doi:10.1097/AOG.0000000000000859.

Barrett, G. and Wellings, K. (2002). What is a 'planned' pregnancy? Empirical data from a British study. *Social Science and Medicine* 55(4): 545–557. doi:10.1016/S0277-9536(01)00187-3.

Beaujouan, E. (2023). Delayed fertility as a driver of fertility decline? In: Schoen, R. (ed.). *The demography of transforming families*. Cham: Springer: 41–63. doi:10.1007/978-3-031-29666-6_4.

Beaujouan, E. and Neels, K. (2025). Delayed fertility and childlessness. In: Schoen, R. (ed.). *Advances in social demography*. Cham: Springer: 349–364. doi:10.1007/978-3-031-89737-5_14.

Beckett, M., Da Vanzo, J., Sastry, N., Panis, C., and Peterson, C. (2001). The quality of retrospective data: An examination of long-term recall in a developing country. *Journal of Human Resources* 36(3): 593–625. doi:10.2307/3069631.

Behrens, R. and Del Mistro, R. (2008). *Analysing changing personal travel behaviour over time: Methodological lessons from the application of retrospective surveys in Cape Town*. 8th international conference on survey methods in transport: harmonisation and data quality, Annecy.

Beringer, S. and Milewski, N. (2024). A crisis in the life course? Pregnancy loss impacts fertility desires and intentions. *Advances in Life Course Research* 60: 100612. doi:10.1016/j.alcr.2024.100612.

Bhrolcháin, M.N., Beaujouan, É., and Murphy, M. (2011). Sources of error in reported childlessness in a continuous British household survey. *Population Studies* 65(3): 305–318. doi:10.1080/00324728.2011.607901.

Bommaraju, A., Kavanaugh, M.L., Hou, M.Y., and Bessett, D. (2016). Situating stigma in stratified reproduction: Abortion stigma and miscarriage stigma as barriers to reproductive healthcare. *Sexual and Reproductive Healthcare* 10: 62–69. doi:10.1016/j.srhc.2016.10.008.

Bratti, M. and Tatsiramos, K. (2012). The effect of delaying motherhood on the second childbirth in Europe. *Journal of Population Economics* 25(1): 291–321. doi:10.1007/s00148-010-0341-9.

Burgio, A., Castagnaro, C., Vignoli, D., and Vitali, A. (2025). The contribution of medically assisted reproduction to total, age-, and parity-specific fertility in Italy. *Human Reproduction* 40(10): 1972–1979. doi:10.1093/humrep/deaf137.

Casterline, J.B. (1989). Collecting data on pregnancy loss: A review of evidence from the World Fertility Survey. *Studies in Family Planning* 20(2): 81–95. doi:10.2307/1966462.

Chambers, G.M., Paul, R.C., Harris, K., Fitzgerald, O., Boothroyd, C.V., Rombauts, L., Chapman, M.G., and Jorm, L. (2017). Assisted reproductive technology in Australia and New Zealand: Cumulative live birth rates as measures of success. *Medical Journal of Australia* 207(3): 114–118. doi:10.5694/mja16.01435.

Cohen, B., Bernson, D., Sappenfield, W., Kirby, R.S., Kissin, D., Zhang, Y., Copeland, G., Zhang, Z., Macaluso, M., and States Monitoring Assisted Reproductive Technology (SMART) Collaborative (2014). Accuracy of assisted reproductive technology information on birth certificates: Florida and Massachusetts, 2004–06. *Paediatric and Perinatal Epidemiology* 28(3): 181–190. doi:10.1111/ppe.12110.

Compans, M.-C. and Väisänen, H. (2025). Social patterns of miscarriage reporting and risk: Insights from survey data in France. *European Journal of Public Health* 35(5): 954–959. doi:10.1093/eurpub/ckaf099.

de La Rochebrochard, E., de Mouzon, J., Thépot, F., and Thonneau, P. (2006). Fathers over 40 and increased failure to conceive: The lessons of in vitro fertilization in France. *Fertility and Sterility* 85(5): 1420–1424. doi:10.1016/j.fertnstert.2005.11.040.

de La Rochebrochard, E., Quelen, C., Peikrishvili, R., Guibert, J., and Bouyer, J. (2009). Long-term outcome of parenthood project during in vitro fertilization and after discontinuation of unsuccessful in vitro fertilization. *Fertility and Sterility* 92(1): 149–156. doi:10.1016/j.fertnstert.2008.05.067.

Dex, S. (1995). The reliability of recall data: A literature review. *Bulletin of Sociological Methodology/Bulletin de Methodologie Sociologique* 49(1): 58–89. doi:10.1177/075910639504900105.

du Fossé, N.A., van der Hoorn, M.-L. P., van Lith, J.M.M., le Cessie, S., and Lashley, E. E.L.O. (2020). Advanced paternal age is associated with an increased risk of spontaneous miscarriage: A systematic review and meta-analysis. *Human Reproduction Update* 26(5): 650–669. doi:10.1093/humupd/dmaa010.

Dudel, C., Cheng, Y.A., and Klüsener, S. (2023). Shifting parental age differences in high-income countries: Insights and implications. *Population and Development Review* 49(4): 879–908. doi:10.1111/padr.12597.

Dunson, D.B., Baird, D.D., and Colombo, B. (2004). Increased infertility with age in men and women. *Obstetrics and Gynecology* 103(1): 51–56. doi:10.1097/01.AOG.0000100153.24061.45.

Eijkemans, M.J., Van Poppel, F., Habbema, D.F., Smith, K.R., Leridon, H., and Te Velde, E.R. (2014). Too old to have children? Lessons from natural fertility populations. *Human Reproduction* 29(6): 1304–1312. doi:10.1093/humrep/deu056.

Festy, P. and Prioux, F. (2002). *An evaluation of the Fertility and Family Surveys project*. New York: United Nations Publications.

Fledderjohann, J. and Roberts, C. (2018). Missing men, missing infertility: The enactment of sex/gender in surveys in low-and middle-income countries. *Population Horizons* 15(2): 66–87. doi:10.1515/pophzn-2018-0003.

Frederiksen, L.E., Ernst, A., Brix, N., Braskhøj Lauridsen, L.L., Roos, L., Ramlau-Hansen, C.H., and Ekelund, C.K. (2018). Risk of adverse pregnancy outcomes at advanced maternal age. *Obstetrics and Gynecology* 131(3): 457–463. doi:10.1097/AOG.0000000000002504.

Gaskell, G.D., Wright, D.B., and O'Muircheartaigh, C.A. (2000). Telescoping of landmark events: Implications for survey research. *The Public Opinion Quarterly* 64(1): 77–89. doi:10.1086/316761.

Gravensteen, I.K., Jacobsen, E.-M., Sandset, P.M., Helgadottir, L.B., Rådestad, I., Sandvik, L., and Ekeberg, Ø. (2018). Anxiety, depression and relationship satisfaction in the pregnancy following stillbirth and after the birth of a live-born baby: A prospective study. *BMC Pregnancy and Childbirth* 18(1): 41. doi:10.1186/s12884-018-1666-8.

Groves, R., Floyd, J., Couper, P., Lepkowski, J., Singer, E., and Tourangeau, R. (2009). *Survey methodology.* Hoboken: Wiley.

Guzzo, K.B. and Hayford, S.R. (2011). Fertility following an unintended first birth. *Demography* 48(4): 1493–1516. doi:10.1007/s13524-011-0059-7.

Guzzo, K.B. and Hayford, S.R. (2014). Fertility and the stability of cohabiting unions: Variation by intendedness. *Journal of Family Issues* 35(4): 547–576. doi:10.1177/0192513X12468104.

Habbema, J.D.F., Eijkemans, M.J., Leridon, H., and te Velde, E.R. (2015). Realizing a desired family size: When should couples start? *Human Reproduction* 30(9): 2215–2221. doi:10.1093/humrep/dev148.

Henretta, J.C., Grundy, E.M., Okell, L.C., and Wadsworth, M.E. (2008). Early motherhood and mental health in midlife: A study of British and American cohorts. *Aging and Mental Health* 12(5): 605–614. doi:10.1080/13607860802343084.

Hogue, C.J.R. (1986). Impact of abortion on subsequent fecundity. *Clinics in Obstetrics and Gynaecology* 13(1): 95–103. doi:10.1016/S0306-3356(21)00156-4.

Hong, X., Yin, J., Wang, W., Zhao, F., Yu, H., and Wang, B. (2022). The current situation and future directions for the study on time-to-pregnancy: A scoping review. *Reproductive Health* 19(1): 150. doi:10.1186/s12978-022-01450-6.

Jackson, L. (2020). Trauma, tragedy and stigma: The discomforting narrative of reproductive rights in Northern Ireland. *Emotion, Space and Society* 35: 100678. doi:10.1016/j.emospa.2020.100678.

Jalovaara, M., Neyer, G., Andersson, G., Dahlberg, J., Dommermuth, L., Fallesen, P., and Lappegård, T. (2019). Education, gender, and cohort fertility in the Nordic countries. *European Journal of Population* 35(3): 563–586. doi:10.1007/s10680-018-9492-2.

Johnson, K.M., Shreffler, K.M., Greil, A.L., and McQuillan, J. (2023). Bearing the reproductive load? Unequal reproductive careers among US women. *Population Research and Policy Review* 42(1): 14. doi:10.1007/s11113-023-09770-6.

Joyner, K., Peters, H.E., Hynes, K., Sikora, A., Taber, J.R., and Rendall, M.S. (2012). The quality of male fertility data in major US surveys. *Demography* 49(1): 101–124. doi:10.1007/s13524-011-0073-9.

Keizer, R., Dykstra, P.A., and Jansen, M.D. (2008). Pathways into childlessness: Evidence of gendered life course dynamics. *Journal of Biosocial Science* 40(6): 863–878. doi:10.1017/S0021932007002660.

Kneale, D. and Joshi, H. (2008). Postponement and childlessness: Evidence from two British cohorts. *Demographic Research* 19(58): 1935–1968. doi:10.4054/DemRes.2008.19.58.

Kreyenfeld, M., Hornung, A., and Kubisch, K. (2013). The German Generations and Gender Survey: Some critical reflections on the validity of fertility histories. *Comparative Population Studies* 38(1). doi:10.12765/CPoS-2013-02.

Kwesiga, D., Tawiah, C., Imam, M.A., Tesega, A.K., Nareeba, T., Enuameh, Y.A.K., Biks, G.A., Manu, G., Beedle, A., Delwar, N., Fisker, A.B., Waiswa, P., Lawn, J.E., Blencowe, H., and the Every Newborn-INDEPTH Study Collaborative Group (2021). Barriers and enablers to reporting pregnancy and adverse pregnancy outcomes in population-based surveys: EN-INDEPTH study. *Population Health Metrics* 19(1): 15. doi:10.1186/s12963-020-00228-x.

Kwesiga, D., Wanduru, P., Eriksson, L., Malqvist, M., Waiswa, P., and Blencowe, H. (2023). Psychosocial effects of adverse pregnancy outcomes and their influence on reporting pregnancy loss during surveys and surveillance: Narratives from Uganda. *BMC Public Health* 23(1): 1581. doi:10.1186/s12889-023-16519-5.

Lang, K. and Nuevo-Chiquero, A. (2012). Trends in self-reported spontaneous abortions: 1970–2000. *Demography* 49(3): 989–1009. doi:10.1007/s13524-012-0113-0.

Lazzari, E., Gray, E., and Baffour, B. (2022). A dyadic approach to the study of perceived subfecundity and contraceptive use. *Demographic Research* 47(1): 1–36. doi:10.4054/DemRes.2022.47.1.

Leridon, H. (2004). Can assisted reproduction technology compensate for the natural decline in fertility with age? A model assessment. *Human Reproduction* 19(7): 1548–1553. doi:10.1093/humrep/deh304.

Leridon, H. (2008). A new estimate of permanent sterility by age: Sterility defined as the inability to conceive. *Population Studies* 62(1): 15–24. doi:10.1080/00324720701804207.

Lewinsohn, R., Crankshaw, T., Tomlinson, M., Gibbs, A., Butler, L., and Smit, J. (2018). 'This baby came up and then he said, "I give up!"': The interplay between unintended pregnancy, sexual partnership dynamics and social support and the impact on women's well-being in KwaZulu-Natal, South Africa. *Midwifery* 62: 29–35. doi:10.1016/j.midw.2018.03.001.

Lima, E., Zeman, K., and Sobotka, T. (2018). *Twentieth century changes in family size in Latin America: Analyses through cohort fertility and parity progression*. Annual Meeting of The Population Association of America. Denver, Colorado, USA: Population Association of America.

Lindberg, L. and Scott, R.H. (2018). Effect of ACASI on reporting of abortion and other pregnancy outcomes in the US National Survey of Family Growth. *Studies in Family Planning* 49(3): 259–278. doi:10.1111/sifp.12068.

Lipson, D.J. (2001). The World Trade Organization's health agenda. *BMJ* 323(7322): 1139. doi:10.1136/bmj.323.7322.1139.

Luk, B.H.-K. and Loke, A.Y. (2015). The impact of infertility on the psychological well-being, marital relationships, sexual relationships, and quality of life of couples: A systematic review. *Journal of Sex and Marital Therapy* 41(6): 610–625. doi:10.1080/0092623X.2014.958789.

Magnus, M.C., Wilcox, A.J., Morken, N.-H., Weinberg, C.R., and Håberg, S.E. (2019). Role of maternal age and pregnancy history in risk of miscarriage: Prospective register based study. *BMJ* 364: l869. doi:10.1136/bmj.l869.

Mathiowetz, N.A. and Ouncan, G.J. (1988). Out of work, out of mind: Response errors in retrospective reports of unemployment. *Journal of Business and Economic Statistics* 6(2): 221–229. doi:10.1080/07350015.1988.10509656.

McCarthy, M.P. and Chiu, S. (2011). Differences in women's psychological well-being based on infertility treatment choice and outcome. *Journal of Midwifery and Women's Health* 56(5): 475–480. doi:10.1111/j.1542-2011.2011.00047.x.

McQuillan, J., Greil, A.L., Rybińska, A., Tiemeyer, S., Shreffler, K.M., and Colaner, C.W. (2021). Is a dyadic stressor experienced as equally distressing by both partners? The case of perceived fertility problems. *Journal of Social and Personal Relationships* 38(1): 342–362. doi:10.1177/0265407520953903.

McQuillan, J., Greil, A.L., and Shreffler, K.M. (2011). Pregnancy intentions among women who do not try: Focusing on women who are okay either way. *Maternal and Child Health Journal* 15(2): 178–187. doi:10.1007/s10995-010-0604-9.

Mertes, H., Harper, J., Boivin, J., Ekstrand Ragnar, M., Grace, B., Moura-Ramos, M., Rautakallio-Hokkanen, S., Simopoulou, M., and Hammarberg, K. (2023). Stimulating fertility awareness: The importance of getting the language right. *Human Reproduction Open* 2023(2): hoad009. doi:10.1093/hropen/hoad009.

Mirowsky, J. (2002). Parenthood and health: The pivotal and optimal age at first birth. *Social Forces* 81(1): 315–349. doi:10.1353/sof.2002.0055.

Morgan, S.P. and Rindfuss, R.R. (1999). Reexamining the link of early childbearing to marriage and to subsequent fertility. *Demography* 36(1): 59–75. doi:10.2307/2648134.

Müggenburg, H. (2021). Beyond the limits of memory? The reliability of retrospective data in travel research. *Transportation Research Part A: Policy and Practice* 145: 302–318. doi:10.1016/j.tra.2021.01.010.

Murphy, M. (2009). Where have all the children gone? Women's reports of more childlessness at older ages than when they were younger in a large-scale continuous household survey in Britain. *Population Studies* 63(2): 115–133. doi:10.1080/00324720902917238.

Nathan, M. and Pardo, I. (2019). Fertility postponement and regional patterns of dispersion in age at first birth: Descriptive findings and interpretations. *Comparative Population Studies* 44: 37–60. doi:10.12765/CPoS-2019-07.

Ong, A.D. and Weiss, D.J. (2000). The impact of anonymity on responses to sensitive questions. *Journal of Applied Social Psychology* 30(8): 1691–1708. doi:10.1111/j.15591816.2000.tb02462.x.

Oyuyo, C. (2024). *Psychological impact of perceptions of infertility and childlessness: A systematic literature review*. (Doctoral dissertation). Chandler, AZ: California Southern University

Pardo, I., Sacco, N., Acosta, E., and Castro, A. (2025). Fertility decline to low and lowest-low levels in Latin America. *Population Research and Policy Review* 44(1): 9. doi:10.1007/s11113-024-09934-y.

Pedro, J., Brandão, T., Schmidt, L., Costa, M.E., and Martins, M.V. (2018). What do people know about fertility? A systematic review on fertility awareness and its associated factors. *Upsala Journal of Medical Sciences* 123(2): 71–81. doi:10.1080/03009734.2018.1480186.

Quenby, S., Gallos, I.D., Dhillon-Smith, R.K., Podesek, M., Stephenson, M.D., Fisher, J., Brosens, J.J., Brewin, J., Ramhorst, R., Lucas, E.S., McCoy, R.C., Anderson, R., Daher, S., Regan, L., Al-Memar, M., Bourne, T., MacIntyre, D.A., Rai, R., Christiansen, O.B., and Coomarasamy, A. (2021). Miscarriage matters: The epidemiological, physical, psychological, and economic costs of early pregnancy loss. *The Lancet* 397(10285): 1658–1667. doi:10.1016/S0140-6736(21)00682-6.

Raymo, J.M., Park, H., Xie, Y., and Yeung, W. J. (2015). Marriage and family in East Asia: Continuity and change. *Annual Review of Sociology* 41(1): 471–492. doi:10.1146/annurev-soc-073014-112428.

Rendall, M.S., Clarke, L., Peters, H.E., Ranjit, N., and Verropoulou, G. (1999). Incomplete reporting of men's fertility in the United States and Britain: A research note. *Demography* 36(1): 135–144. doi:10.2307/2648139.

Rybińska, A. and Morgan, S.P. (2019). Childless expectations and childlessness over the life course. *Social Forces* 97(4): 1571–1602. doi:10.1093/sf/soy098.

Schmidt, L., Sobotka, T., Bentzen, J.G., Nyboe Andersen, A., and on behalf of the ESHRE Reproduction and Society Task Force (2012). Demographic and medical consequences of the postponement of parenthood. *Human Reproduction Update* 18(1): 29–43. doi:10.1093/humupd/dmr040.

Scott, R.H., Bajos, N., Wellings, K., and Slaymaker, E. (2019). Comparing reporting of abortions in three nationally representative surveys: Methodological and contextual influences. *BMJ Sexual and Reproductive Health* 45(3): 213–219. doi:10.1136/bmjsrh-2019-200321.

Singh, S. (2024). *Too old to be sure: Swinging fertility timing intentions of childless men and women over the life course*. Paper presented at Wittgenstein Centre Conference, Vienna, Austria, November 19–21, 2024. https://www.oeaw.ac.at/vid/news-events/calendar/conferences/delayed-reproduction-challenges-and-prospects.

Slabá, J., Kocourková, J., and Šťastná, A. (2024). The fertility timing gap: The intended and real timing of childbirth. *Journal of Biosocial Science* 56(3): 504–517. doi:10.1017/s002193202400004x.

Slabá, J., Šťastná, A., and Kocourková, J. (2024). *The impact of interfering reproductive events on the spacing between first and second live birth*s. Paper presented at Wittgenstein Centre Conference, Vienna, Austria, November 19–21, 2024. https://www.oeaw.ac.at/vid/news-events/calendar/conferences/delayed-reproduction-challenges-and-prospects.

Slauson-Blevins, K. and Johnson, K.M. (2016). Doing gender, doing surveys? Women's gatekeeping and men's non-participation in multi-actor reproductive surveys. *Sociological Inquiry* 86(3): 427–449. doi:10.1111/soin.12122.

Strong, J., Coast, E., Freeman, E., Moore, A.M., Norris, A.H., Owolabi, O., and Rocca, C.H. (2023). Pregnancy recognition trajectories: A needed framework. *Sexual and Reproductive Health Matters* 31(1): 2167552. doi:10.1080/26410397.2023.2167552.

Sunkara, S.K., Zheng, W., D'Hooghe, T., Longobardi, S., and Boivin, J. (2020). Time as an outcome measure in fertility-related clinical studies: Long-awaited. *Human Reproduction* 35(8): 1732–1739. doi:10.1093/humrep/deaa138.

Tennekoon, V.S. (2017). Counting unreported abortions: A binomial-thinned zero-inflated Poisson model. *Demographic Research* 36(2): 41–72. doi:10.4054/DemRes.2017.36.2.

Thoma, M.E., Boulet, S., Martin, J.A., and Kissin, D. (2014). Births resulting from assisted reproductive technology: Comparing birth certificate and National ART Surveillance System Data, 2011. *National Vital Statistics Reports: From the Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System* 63(8): 1–11. https://stacks.cdc.gov/view/cdc/231844.

Tourangeau, R. and Yan, T. (2007). Sensitive questions in surveys. *Psychological Bulletin* 133(5): 859–883. doi:10.1037/0033-2909.133.5.859.

Troude, P., Bailly, E., Guibert, J., Bouyer, J., de La Rochebrochard, E., and DAIFI Group. (2012). Spontaneous pregnancies among couples previously treated by in vitro fertilization. *Fertility and Sterility* 98(1): 63–68. doi:10.1016/j.fertnstert.2012.03.058.

Trussell, J. and Menken, J. (1978). Early childbearing and subsequent fertility. *Family Planning Perspectives* 10(4): 209–218. doi:10.2307/2134269.

Tymicki, K. (2010). Validation of data quality from Polish Fertility Survey 2002 with use of cohort fertility rates. *Studia Demograficzne* 157–158: 61–77. https://econjournals.sgh.waw.pl/SD/article/view/2585.

Tymicki, K. (2017). Measuring the waiting time to pregnancy with the use of a retrospective questionnaire in the course of the GGS-PL study entitled 'generations and gender survey.' *Zdrowie Publiczne i Zarządzanie* 15(2): 161–171. doi:10.4467/20842627OZ.17.018.6788.

United Nations Population Fund (UNFPA) (2025). *State of world population 2025: The real fertility crisis-the pursuit of reproductive agency in a changing world*. Sterling, VA: Stylus Publishing, LLC.

Väisänen, H. and Batyra, E. (2022). Unintended pregnancy resolution among parous women in twelve low-and middle-income countries. *Journal of Biosocial Science* 54(4): 698–724. doi:10.1017/S0021932021000225.

Van Gorkom, F. (2021). *Infertility in South Africa: A neglected issue in need of a public health response*. (Master's thesis). Amsterdam: Royal Tropical Institute.

van Noord-Zaadstra, B.M., Looman, C.W., Alsbach, H., Habbema, J.D., te Velde, E.R., and Karbaat, J. (1991). Delaying childbearing: Effect of age on fecundity and outcome of pregnancy. *British Medical Journal* 302(6789): 1361–1365. doi:10.1136/bmj.302.6789.1361.

Vergauwen, J., Neels, K., Wood, J., and De Wachter, D. (2015). Quality of demographic data in GGS Wave 1. *Demographic Research* 32(24): 723–774. doi:10.4054/DemRes.2015.32.24.

Watson, K. and Angelotta, C. (2022). The frequency of pregnancy recognition across the gestational spectrum and its consequences in the United States. *Perspectives on Sexual and Reproductive Health* 54(2): 32–37. doi:10.1363/psrh.12192.

Weisberg, H.F. (2005). *The total survey error approach. A guide to the new science of survey*. Chicago: University of Chicago Press

Wood, J.W. (1989). Fecundity and natural fertility in humans. *Oxford Reviews of Reproductive Biology* 11: 61–109.

Wu, L.L., Martin, S.P., and Long, D.A. (2001). Comparing data quality of fertility and first sexual intercourse histories. *The Journal of Human Resources* 36(3): 520–555. doi:10.2307/3069629.

Yan, T. and Tourangeau, R. (2022). Detecting underreporters of abortions and miscarriages in the national study of family growth, 2011–2015. *Plos One* 17(8): e0271288. doi:10.1371/journal.pone.0271288.

Appendix (Final module questionnaire)

Czech version of the module, which is part of the GGS-II wave 2 questionnaire, piloted in the Czech Republic in November 2024 and collected in the field from 01/2025.

ENGLISH VERSION

Intro
In the following questions, we will ask you about situations that can occur before the first pregnancy. If you have tried to conceive a child multiple times, we are interested in the period when you first attempted, regardless of the outcome.

Q1. At what age did you attempt to conceive a child for the first time, if ever?

……

[1] I have never attempted to conceive a child
[97] *Don't know*
[98] *I don't want to answer (Refuse)*

IF [Q1 != 1]
Q2. When people try to have a child, things can turn out very differently — some conceive a child right away, some after a long time, and sometimes the effort is unsuccessful. Please think back to your own experience. When you tried to have a child for the first time, how did the effort eventually turn out?

[1] This effort eventually resulted in pregnancy
[2] I am still trying to have a child
[3] After some time, I stopped trying to have a child
[97] *Don't know*
[98] *I don't want to answer (Refuse)*

IF [Q2 != 2]
Q3a. Did you/your partner use any of these methods to help you get pregnant on that first occasion? Please select all of the methods you have been using.

IF [Q2 == 2]

Q3b. Have you/your partner been using any of these methods to help you get pregnant? Please select all of the methods you have been using.

[1] Receiving prescribed medication
[2] Methods for ascertaining timing of ovulation
[3] In vitro fertilisation (IVF) or micro-fertilisation (ICSI)
[4] Surgery
[5] Artificial insemination
[6] Consulted a physician
[7] Other medical treatment
[8] No, no method to help with getting pregnant
[97] *Don't know*
[98] *I don't want to answer (Refuse)*

IF [Q2 == 1]

Q4a. How many years or months did it take to conceive a child that first time? Please tell us the number of years and months.

If you are unsure of the precise number, please provide your best estimate. You can combine months and years (for example, 2 years and 2 months) or just use one of the two boxes below and fill 0 into the other (for example, 0 years and 26 months).

Number of months: ……..
[97] *Don't know*
Number of years: …….
[97] *Don't know*

IF [Q2 == 3]

Q4b. After how many years or months did you stop trying to conceive a child that first time? Please tell us the number of years and months.

If you are unsure of the precise number, please provide your best estimate. You can combine months and years (for example, 2 years and 2 months) or just use one of the two boxes below and fill 0 into the other (for example, 0 years and 26 months).

Number of months: ……..
[97] *Don't know*
Number of years: …….
[97] *Don't know*

IF [Q2 == 3]
Q5. Why did you stop trying to have a child at that time? Please select one main reason.

[1] I separated from my partner
[2] My economic or housing conditions changed
[3] I started focusing on something else
[4] I didn't want a child anymore
[5] I did not want to undergo (further) infertility treatment
[6] I was unable to undergo (further) infertility treatment for health reasons
[7] I did not have enough money to pay for (further) infertility treatment
[8] Other reason
[97] *Don't know*
[98] *I don't want to answer (Refuse)*

IF [Q2 == 1]
Q6. What was the result of this pregnancy?

[1] Live birth
[2] The pregnancy is ongoing
[3] Induced abortion
[4] Miscarriage
[5] Stillbirth
[97] *Don't know*
[98] *I don't want to answer (Refuse)*

Q7. Did you ever conceive a child without actively trying?

[1] Yes
[2] No
[97] *Don't know*
[98] *I don't want to answer (Refuse)*

IF [Q7 == 1]
Q8. How old were you when it occurred? If it occurred multiple times, report your age at the first occasion.

[97] *Don't know*
[98] *I don't want to answer (Refuse)*

IF [Q7 == 1]
Q9. What was the result of this pregnancy?

[1] Live birth
[2] The pregnancy is ongoing
[3] Induced abortion
[4] Miscarriage
[5] Stillbirth
[97] *Don't know*
[98] *I don't want to answer (Refuse)*

CZECH VERSION
Intro
V následujících otázkách nás zajímají zkušenosti, které mohou předcházet prvnímu otěhotnění. Pokud jste se o dítě pokoušel/a vícekrát, bude nás zajímat období, kdy se tak stalo poprvé, bez ohledu na to, jak to nakonec dopadlo.

Q1 V jakém věku jste se poprvé začal/a pokoušet o dítě, pokud vůbec?

[1] Nikdy jsem se nepokoušel/a o dítě
[97] Nevím
[98] Nechci odpovědět

IF [Q1 != 1]
Q2 Když se lidé pokoušejí o dítě, věci mohou mít velmi odlišný průběh – někdy otěhotní hned, někdy až po velmi dlouhé době a někdy je tato snaha neúspěšná.
Vzpomeňte si, prosím, jak to bylo u Vás. Když jste se poprvé pokoušel/a o dítě, jak tato snaha nakonec dopadla?

[1] Tato snaha nakonec skončila těhotenstvím
[2] Stále se pokouším o dítě
[3] Po určité době jsem se přestal/a pokoušet o dítě
[97] Nevím
[98] Nechci odpovědět

IF [Q2 != 2]

Q3a Využil/a jste Vy nebo váš/e partner/ka při této (první) příležitosti některou z následujících metod, které by Vám / Vaší partnerce pomohly otěhotnět? Označte, prosím, všechny metody, které jste použili.

IF [Q2 == 2]

Q3b Využíváte Vy nebo Váš/e partner/ka některou z následujících metod, které by Vám / Vaší partnerce pomohly otěhotnět? Označte, prosím, všechny metody, které jste použili/používáte.

[1] Užívání léků na předpis
[2] Metody zjišťující dobu ovulace
[3] Mimotělní oplodnění (IVF) nebo injekce spermie do vajíčka (ICSI)
[4] Chirurgická operace
[5] Umělá inseminace
[6] Konzultace s lékařem
[7] Jiná léčba
[8] Ne, žádnou metodu napomáhající otěhotnění
[97] Nevím
[98] Nechci odpovědět

IF [Q2 == 1]

Q4a Kolik let anebo měsíců uplynulo, než se Vám při této první příležitosti podařilo počít? Uveďte prosím počet let a počet měsíců.

Pokud si nejste jisti přesným počtem, zkuste jej, prosím, co nejpřesněji odhadnout. Při vyplňování můžete kombinovat měsíce a roky (např. 2 roky a 2 měsíce) nebo použít jen jednu kolonku a do druhé uveďte 0 (např. 0 let a 26 měsíců).

Počet měsíců: ……..
[97] Nevím
Počet let: …….
[97] Nevím

IF [Q2 == 3]

Q4b Po kolika letech anebo měsících jste se při této první příležitosti přestal/a pokoušet o dítě? Uveďte prosím počet let a počet měsíců.

Pokud si nejste jisti přesným počtem, zkuste jej, prosím, co nejpřesněji odhadnout. Při vyplňování můžete kombinovat měsíce a roky (např. 2 roky a 2 měsíce) nebo použít jen jednu kolonku a do druhé uveďte 0 (např. 0 let a 26 měsíců).

Počet měsíců: ……..
[97] Nevím
Počet let: …….
[97] Nevím

IF [Q2 == 3]

Q5 Proč jste se tehdy přestal/a pokoušet o dítě? Vyberte, prosím, jeden hlavní důvod.

[1] Rozešel/Rozešla jsem se s partnerem/kou
[2] Změnily se moje ekonomické nebo bytové podmínky
[3] Začal/a jsem se věnovat něčemu jinému
[4] Už jsem si nepřál/a dítě
[5] Nechtěl/a jsme podstoupit (další) léčbu neplodnosti
[6] Nemohl/a jsem podstoupit (další) léčbu neplodnosti ze zdravotních důvodů
[7] Neměl/a jsme dost peněz na zaplacení (další) léčby neplodnosti
[8] Jiný důvod
[97] Nevím
[98] Nechci odpovědět

IF [Q2 == 1]

Q6 Jaký byl výsledek tohoto těhotenství?

[1] Živě narozené dítě
[2] Těhotenství stále trvá
[3] Umělé přerušení těhotenství (interrupce)
[4] Samovolný potrat
[5] Narození mrtvého dítěte/plodu
[97] Nevím
[98] Nechci odpovědět

Q7 Stalo se někdy, že jste otěhotněla / že s Vámi některá žena otěhotněla, aniž byste se aktivně pokoušel/a o dítě?

[1] Ano
[2] Ne
[97] Nevím
[98] Nechci odpovědět

IF [Q7 == 1]
Q8 Kolik Vám bylo let, když k tomuto těhotenství došlo? V případě, že se tak stalo vícekrát, uveďte věk, kdy se tak stalo poprvé.

[97] Nevím
[98] Nechci odpovědět

IF [Q7 == 1]
Q9 Jaký byl výsledek tohoto těhotenství?

[1] Živě narozené dítě
[2] Těhotenství stále trvá
[3] Umělé přerušení těhotenství (interrupce)
[4] Samovolný potrat
[5] Narození mrtvého dítěte/plodu
[97] Nevím
[98] Nechci odpovědět