

# Uninformed Decision Making and Regret About the Delay in Childbearing Decision Among Japanese Women and Men Seeking Fertility Treatment: A Cross-Sectional Study

Tomoko Adachi (✉ [adachitomoco@sahs.med.osaka-u.ac.jp](mailto:adachitomoco@sahs.med.osaka-u.ac.jp))

Osaka University <https://orcid.org/0000-0002-5168-3847>

Masayuki Endo

Osaka university

Kazutomo Ohashi

Osaka University

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## Research

**Keywords:** uninformed decision making, regret, delay in childbearing, fertility knowledge, preconception health

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## Abstract

**Background:** In Japan, mean maternal and paternal ages at first birth have steadily increased over the past two decades, and more and more women and men seek fertility treatment. The aim of this study was to examine regret over the timing of the childbearing decision and reasons for its delay. **Methods:** This cross-sectional study included 219 women and 169 men referred to fertility facilities in Japan from July to December 2018. Participants completed a questionnaire on the reasons for their delay in childbearing decision and the degree of regret regarding their decision. Multiple linear regression was used to analyze the association between degree of regret and the reasons for the delay. **Results:** The top three reasons for the delay in childbearing decision in women were “Establishing the relationship,” “Health problems,” and “Financial security.” The top three reasons in men were “Establishing the relationship,” “Financial security,” and “Lack of fertility knowledge.” Lack of fertility knowledge was associated with regret over the timing of the childbearing decision in women ( $\beta = 0.232$ , 95% CI = 0.075-0.318,  $p = 0.002$ ) and men ( $\beta = 0.238$ , 95% CI = 0.083-0.371,  $p = 0.002$ ). In men, health problems was also associated with regret over the timing of the childbearing decision ( $\beta = 0.196$ ; 95% CI = 0.039-0.332,  $p = 0.013$ ). **Conclusions:** Uninformed decision making based on lack of fertility knowledge was significantly associated with regret later in life. It is important for early reproductive-aged women and men to have fertility knowledge in order to make an informed decision about the timing of childbearing to alleviate the possibility of experiencing regret later in life. **Keywords:** uninformed decision making, regret, delay in childbearing, fertility knowledge, preconception health

## Plain English Summary

In Japan, the average age of men and women when they have their first child has steadily increased over the past two decades, and more and more women and men have been seeking fertility treatment. The aim of this study was to examine people’s regret over the timing of the decision to have their first child and the reasons for delaying that decision. The study included 219 women and 169 men seeking treatment at fertility facilities in Japan in 2018. They completed a questionnaire on the reasons for delaying their decision and the degree of regret they have regarding delaying the decision. We found that the top three reasons why women delayed their decision were “Establishing the relationship,” “Health problems,” and “Financial security.” The top three reasons in men were “Establishing the relationship,” “Financial security,” and “Lack of fertility knowledge.” Lack of fertility knowledge was associated with regret over the timing of the childbearing decision in both women and men. In men, health problems was also associated with regret over the timing of the decision. In conclusion, when men and women do not have knowledge about fertility they make uninformed decisions about when to have a child, and this can lead to feelings of regret later in life. Therefore, it is important for early reproductive-aged women and men to have fertility knowledge in order to make an informed decision about the timing of childbearing to alleviate the possibility of experiencing regret later in life.

## Background

Mean maternal and paternal ages at first birth have steadily increased over the past two decades in Japan, from 27.5 and 30.0 years in 1995 to 30.7 and 32.8 years in 2016, respectively [1]. An advanced age has been associated with an increased rate of infertility.

Women and men in some developed countries delay childbearing for reasons such as establishing their relationship, financial security, educational pursuits, career development, and based on their personal and their partner’s interest or desire to have children [2–5]. Adding to these reasons, a lack of fertility knowledge such as age-related infertility and risk factors of infertility have been noted [6–8]. In an international study, Japanese men and women had the second lowest fertility knowledge among participants from 18 countries [6]. Uninformed decision making about delaying having children may ultimately cause involuntary childlessness [9].

Previous qualitative studies have reported that women and men who delayed the timing of the childbearing decision experienced feelings of regret [10–12]. Regret arises from the contrast between a negative outcome resulting from an erroneous decision and an alternative, better outcome that might have happened [13, 14]. Given the literature on regret and delaying the decision to have children, the purpose of the present study was to examine the degree of regret over the timing of the childbearing decision and

reasons for its delay among Japanese women and men seeking fertility treatment. In addition, we examined the association between regret over the timing of the decision and the reasons for the delay. By identifying the reasons for delaying the childbearing decision and its relationship to regret, health professionals and the public will be better informed about those factors that can effect the childbearing decision and thereby possibly avoid experiencing feelings of regret in the future.

## Methods

### Study design and participants

This was a cross-sectional study using a self-administered questionnaire conducted from July to December 2018. The study was conducted in accord with prevailing ethical principles and was approved by the Research Ethics Committee of Osaka University (No.18041). We recruited couples seeking fertility treatment in fertility facilities designated in the fertility treatment support project by the Ministry of Health, Labour and Welfare in Japan. The recruitment of participants was aimed at ensuring that the sample was representative of the general population of women and men seeking fertility treatment. First, we divided the Japanese archipelago into two regions, East and West. The two regions were comparable in terms of the number of fertility facilities: 361 in East Japan and 350 in West Japan. We then identified the facilities with fertility counselors certified by the Japan Society for Infertility Counseling. In consideration of ethics when conducting research with human subjects, fertility counselors could carefully explain the intention of our study to the participants to minimize any psychological burden related to answering the questionnaire. Finally, we selected nine independent facilities based on their size: four in East Japan and five in West Japan.

The sample comprised couples seeking infertility treatment who had been referred to the facility. At the recruitment stage, potential participants were not excluded on the basis of primary or secondary infertility. However, the final sample included only those women and men with primary infertility (those without a child), because the focus of the present study was on the reasons for delaying the childbearing decision for the first child. Of 641 couples that were recruited, 457 individuals completed the survey (35.6% response rate). Of the 457 individuals, 388 were without a child (219 women and 169 men). All of the responses had no missing values for the data used for statistical analysis. The mean age of the women was 34.9 (SD = 5.0), and the mean age of the men was 35.9 (SD = 5.7). All participants were married. The mean age when participants married was 31.3 (SD = 5.1) and 32.5 (SD = 5.9) for women and men respectively. Detailed demographic and fertility data by gender are provided in Table 1.

Table 1  
Demographic and fertility characteristics

		Women (n = 219)	Men (n = 169)
Characteristics		n (%)	n (%)
Age when married	20–29	100 (45.7)	67 (39.6)
	30–39	106 (48.4)	76 (45.0)
	40–49	11 (5.0)	25 (14.8)
	Missing data	2 (0.9)	1 (0.6)
Education	Junior high school	4 (1.8)	4 (2.4)
	High school	40 (18.3)	35 (20.7)
	Junior college	43 (19.6)	3 (1.8)
	University	83 (37.9)	85 (50.3)
	Graduate school	14 (6.4)	24 (14.2)
	Other	35 (16.0)	18 (10.7)
Employment status	Employed full-time	94 (42.9)	150 (88.8)
	Employed part-time	66 (30.1)	4 (2.4)
	Self-employed	11 (5.0)	14 (8.3)
	Without paid work	45 (20.5)	0 (0.0)
	Other	1 (0.5)	1 (0.6)
	Missing data	2 (0.9)	0 (0.0)
Annual household income	< 4 million JPY	24 (11.0)	9 (5.3)
	4–7 million JPY	125 (57.1)	115 (68.0)
	≥ 8 million JPY	69 (31.5)	45 (26.6)
	Missing data	1 (0.5)	0 (0.0)
Duration of infertility	< 12 months	30 (13.7)	22 (13.0)
	12–23 months	73 (33.3)	56 (33.1)
	24–35 months	55 (25.1)	461 (24.3)
	36–47 months	24 (11.4)	27 (16.0)
	≥ 48 months	36 (16.4)	23 (13.6)
Used assisted reproductive technology	No	151 (68.9)	117 (69.2)
	Yes	67 (30.6)	51 (30.2)
	Missing data	1 (0.5)	1 (0.6)

## Measures

The degree of regret over the timing of the childbearing decision was assessed with the question, “Would you liked to have made a childbearing decision at an earlier time in your life?” Participants responded to the question using a seven-point Likert scale where 1 = strongly disagree and 7 = strongly agree.

We assessed eight reasons for the delay in childbearing decision that were selected from previous studies [2, 15, 16]. The reasons were as follows: (1) I wanted children earlier but I was not in a relationship (Establishing the relationship), (2) I wanted to be financially secure before having children (Financial security), (3) I was not interested in having children until recently (Personal desire to have children), (4) I wanted to pursue my career before having children (Career development), (5) I wanted children earlier but I could not get support from my workplace (Workplace support), (6) I was unaware that women's chance of having children is age-related (Lack of fertility knowledge), (7) I wanted children earlier but my partner was not interested in having children (Partner's desire to have children), and (8) Health problems prevented me from having children earlier (Health problems). Participants responded to each of the reasons with regard to how strongly they agreed that the reason influenced the timing of the childbearing decision using a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree).

We also asked for information on demographics (age, gender, age when married, education, employment status, and annual household income) and fertility (previous live birth, duration of infertility, and use of assisted reproductive technology).

## Procedures

Oral and written information about the study and an informed consent form were given by staff or the researcher who is the first author of this study to couples or individual women and men who came to the fertility facilities. The staff who asked the patients to participate in the study were fertility counselors certified by the Japan Society for Infertility Counseling. The couples or individuals who indicated their intention to participate in the study received two copies of the questionnaire. If the couple was present, they were both given a questionnaire. If only one person was present, they were given two questionnaires: one for themselves and the other for their partner. The questionnaires were taken home and returned by mail within two weeks.

## Statistical analyses

Descriptive statistics were calculated to examine the degree of regret over the timing of the childbearing decision and reasons for delaying the decision. The Mann-Whitney U test was used to assess differences in the degree of regret between women and men. Multiple linear regression analyses adjusting for age and the duration of infertility were used to investigate whether the eight reasons for the delay in childbearing decision were associated with regret over the timing of the decision.

It was estimated that an appropriate sample size was 150 couples for the multiple linear regression analyses, which is based on 15 times the number of independent variables. Data were analyzed using IBM SPSS Statistics for Windows version 25.0 (IBM Corporation, Tokyo, Japan) and the level of significance was set at 0.05.

## Results

### Regret and the timing of the childbearing decision

Table 2 shows the degree of regret over the timing of the childbearing decision in response to the question, "Would you liked to have made a childbearing decision at an earlier time in your life?" Those who answered "Agree" or "Strongly agree" comprised 57.5% of the women and 46.2% of the men. The Mann-Whitney U test showed that scores for regret were significantly higher for women than men ( $p < 0.001$ ).

Table 2  
Regret over the timing of the childbearing decision

	Strongly disagree n (%)	Disagree n (%)	Somewhat disagree n (%)	Neither agree nor disagree n (%)	Somewhat agree n (%)	Agree n (%)	Strongly agree n (%)	Median (IQR <sup>a</sup> )	p value
Women (n = 219)	5 (2.3)	10 (4.6)	7 (3.2)	27 (12.3)	44 (20.1)	34 (15.5)	92 (42.0)	6 (5, 7)	0.001
Men (n = 169)	7 (4.1)	10 (5.9)	17 (10.1)	29 (17.2)	28 (16.6)	41 (24.3)	37 (21.9)	5 (4, 6)	

<sup>a</sup> Interquartile range.

## Reasons for the delay in childbearing decision

Table 3 shows the reasons for the delay in childbearing decision for men and women in the order of highest to lowest mean score. Participants who responded with “Agree” or “Strongly agree” were considered as those who agreed. For women, the top three reasons with the highest mean scores were (1) establishing the relationship, (2) health problems, and (3) financial security, in that order. For the men, the order for the top three reasons was (1) establishing the relationship, (2) financial security, and (3) lack of fertility knowledge. The reason for the delay in childbearing decision in which 20% or more answered “Agree” or “Strongly agree” was establishing the relationship (32.4% of the women and 23.7% of the men). The percent of agreement for all the other reasons was less than 20%.

Table 3  
Reasons for the delay in childbearing decision

Women (n = 219) Reason	Mean (SD)	Women who agreed <sup>a</sup> n (%)	Men (n = 169) Reason	Mean (SD)	Men who agreed <sup>a</sup> n (%)
Establishing the relationship	3.3 (2.2)	71 (32.4)	Establishing the relationship	3.8 (2.4)	40 (23.7)
Health problems	3.2 (2.1)	36 (16.4)	Financial security	3.2 (2.1)	31 (18.3)
Financial security	3.1 (2.0)	33 (15.1)	Lack of fertility knowledge	2.8 (1.8)	15 (8.9)
Lack of fertility knowledge	2.8 (1.9)	27 (12.3)	Career development	2.4 (1.7)	10 (5.9)
Career development	2.7 (2.0)	27 (12.3)	Health problems	2.2 (1.8)	16 (9.5)
Workplace support	2.7 (1.8)	20 (9.1)	Personal desire to have children	2.2 (1.5)	5 (3.0)
Personal desire to have children	2.1 (1.5)	9 (4.1)	Workplace support	2.0 (1.3)	5 (3.0)
Partner’s desire to have children	1.9 (1.4)	6 (2.7)	Partner’s desire to have children	1.8 (1.3)	4 (2.4)

<sup>a</sup> The numbers and percentages include participants who responded with “Agree” or “Strongly agree.”

## Delaying the childbearing decision and subsequent regret

Table 4 shows the association between regret over the timing of the childbearing decision and the eight reasons for delaying the decision after adjusting for age and the duration of infertility. Multiple linear regression analyses revealed that lack of fertility knowledge was a significant positive predictor of regret over the timing of the childbearing decision in both women and men. In men, health problems was also a significant positive predictor of regret over the timing of the decision.

Table 4

Reasons for the delay in childbearing decision associated with regret adjusting for age and the duration of infertility

Characteristics	Women (n = 219) R = 0.384; R <sup>2</sup> = 0.148; Adjusted R <sup>2</sup> = 0.107, p < 0.001				Men (n = 169) R = 0.404; R <sup>2</sup> = 0.164; Adjusted R <sup>2</sup> = 0.111, p = 0.001			
	Non-standardized coefficient (B)	95% CI	Standardized coefficient (β)	p value	Non-standardized coefficient (B)	95% CI	Standardized coefficient (β)	p value
Age	0.085	0.037–0.132	0.264	0.001	0.033	-0.017–0.082	0.109	0.194
Duration of infertility	-0.003	-0.012–0.005	-0.054	0.450	0.017	0.003–0.031	0.192	0.016
Reason for delaying childbearing decision								
1) Establishing the relationship	-0.030	-0.125–0.065	-0.046	0.534	-0.060	-0.191–0.070	-0.076	0.364
2) Financial security	0.111	-0.008–0.229	0.139	0.068	-0.067	-0.224–0.098	-0.082	0.399
3) Personal desire to have children	-0.115	-0.269–0.038	-0.111	0.139	0.046	-0.145–0.237	0.041	0.634
4) Career development	-0.033	-0.165–0.099	-0.041	0.625	-0.006	-0.208–0.195	-0.006	0.952
5) Workplace support	0.042	-0.088–0.173	0.049	0.522	-0.093	-0.307–0.122	-0.073	0.395
6) Lack of fertility knowledge	0.197	0.075–0.318	0.232	0.002	0.227	0.083–0.371	0.238	0.002
7) Partner's desire to have children	0.029	-0.130–0.189	0.026	0.718	-0.010	-0.206–0.187	-0.007	0.922
8) Health problems	-0.054	-0.157–0.048	-0.071	0.300	0.186	0.039–0.332	0.196	0.013

## Discussion

This cross-sectional study investigated the degree of regret over the timing of the childbearing decision and reasons for delaying the decision among Japanese women and men seeking fertility treatment. We also explored the association between regret over the timing and reasons for the delay.

Women and men who had feelings of regret over the delay in childbearing decision were 57.3% and 49.5% respectively. The most common reasons for the delay in childbearing decision for both women and men were establishing their relationship and having financial security. These findings are similar to the reasons reported in a study of women seeking fertility treatment in Australia [2]. A stable relationship has been identified as the most important factor for childbearing [16, 17]. Although the participants in the present study were all married at the time of the study, it had taken a long time for them to find a stable partner or to get married. Financial security was the second most important reason in the Australian study, as well as the second most important reason that men and women had in common in the present study. Financial stability is certainly essential for parenting children.

However, women and men must also understand the cost of fertility treatment [16, 18], because they potentially may spend more money for fertility treatment by delaying the childbearing decision, and it may cause more financial hardship [19].

Except for establishing the marital relationship as a reason for the delay in childbearing decision, all other reasons were endorsed by less than 20% of the participants. Our results suggest that perhaps some of the participants may have delayed the childbearing decision for reasons that were not covered in our survey, or it may be that there was no apparent reason for the delay. The Centers for Disease Control and Prevention [20] encourage women and men to have a reproductive life plan. Making a reproductive life plan gives women and men an opportunity to explore their values and preferences about whether or when to have children [21].

One reason for regretting the timing of the childbearing decision was lack of fertility knowledge, which was found in both women and men. Many studies have reported that fertility knowledge is necessary to prevent women and men from delaying the childbearing decision [22, 23]. School-based sex education in Japan has traditionally focused on contraception and sexually transmitted diseases [8]. Such a traditional model of sex education might lead to overestimating the chances of conception [12, 24], and uninformed decision making about the timing of childbearing. It is important to have knowledge not only to avoid pregnancy but also to achieve healthy conception. "Preconception care" has the aim of having women and men think about their future with regard to pregnancy, be conscious of caring for their health, and live a healthy life [20]. In the United States, several states have developed tools to facilitate a reproductive life plan and promote preconception health, and some tools are also developed for middle school and high school students [25]. We, therefore, need to provide information of a reproductive life plan in school-based sex education in Japan.

The present study found an association between health problems and regret over the timing of the childbearing decision only in men. In women, it was the second most important reason for the delay in childbearing decision but not related to feelings of regret. Men typically do not consider how their health may be associated with the physiological difficulties of having a child [5]; however, men who attended fertility counseling reported that they had tried to change their lifestyle behaviors after becoming aware of their fertility problem [26]. Preconception care, which is health care before pregnancy, can ameliorate disease, improve the risk status, and prevent poor pregnancy outcomes [27, 28]. The Centers for Disease Control and Prevention [20] states that preconception health is important for both women and men; there are behaviors they can do for their own health, such as preventing sexually transmitted infections, quit smoking, and maintaining a healthy weight. Educating people on preconception health may allow them to make informed reproductive choices and decisions [29].

The timing of the childbearing decision is an individual one, so it does not mean that the decision to delay childbearing is wrong or necessarily will result in feelings of regret. However, it is important for early reproductive-aged women and men to have the opportunity to think about parenting and to decide what is best for them with accurate and sufficient fertility knowledge. Health professionals such as gynecologists and nurses/midwives should promote fertility knowledge including preconception health, and encourage informed decision making about the timing of childbearing.

There are two important limitations to this study that should be noted. First, the sample comprised only women and men who were seeking fertility treatment. Therefore, regret over the timing of the childbearing decision and reasons for delaying the decision may not be representative of women and men not seeking such treatment or those who were unsuccessful after attempting fertility treatment. Second, our retrospective design may result in recall bias, because the accuracy of the participants' memories may be influenced by subsequent events and experiences, thereby posing a potential threat to the internal validity of the study.

## Conclusions

Common reasons for the delay in childbearing decision for both women and men were wanting to first establish their marital relationship and having financial security. Additionally, for both women and men, the reason associated with feelings of regret for the delay in the decision was lack of fertility knowledge. The lack of knowledge therefore is what allows for making an uninformed decision. It is important for women and men to have fertility knowledge in order to make an informed decision about the timing of childbearing, although the timing of the childbearing decision is an individual one that involves considering many

factors. Health professionals should pursue opportunities to promote fertility knowledge in early reproductive-aged women and men. In addition, health problems was associated with regret in men, while it was the second most important reason for the delay in childbearing decision in women. To avoid any regrets in their reproductive life, it would be important for women and men to acquire fertility knowledge and good health through preconception care.

## Declarations

### Ethics approval and consent to participate

This study was approved by the Research Ethics Committee of Osaka University (No.18041). All participants were provided with a face-to-face explanation on the purpose and methods of this study and gave their written consent.

### Consent for publication

Not applicable.

### Availability of data and materials

The datasets used in this study are available from the corresponding author on reasonable request.

### Competing interests

The authors declare that they have no competing interests.

### Funding

No funding was received.

### Authors' contributions

TA and KO designed the study and interpreted all the data. TA collected and analyzed the data and wrote the first draft of the manuscript. ME and KO were involved in critically assessing the manuscript. All authors read and approved the final manuscript

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