

# Regret over the delay in childbearing decision negatively associates with life satisfaction among Japanese women and men seeking fertility treatment: a cross-sectional study

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## Research article

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# Abstract

## Background

Currently, in developed countries, more and more women and men intend to delay childbearing and, later in life, seek fertility treatment. Some women undergoing infertility treatment develop negative feelings (anxiety, depression and irritation) associated with low life satisfaction. We aimed to examine the association between infertility-related factors, including regret over the delay in childbearing decision and life satisfaction, among Japanese women and men seeking fertility treatment.

## Methods

This cross-sectional study included 253 women and 196 men referred to fertility facilities in Japan from July to December 2018. Participants completed a questionnaire on infertility-related factors, regret over the delay in childbearing decision, life satisfaction and sociodemographic characteristics. Life satisfaction was measured with Satisfaction with Life Scale, and the degree of regret over delay in childbearing decision was measured using a seven-point Likert scale. Participants were divided into two groups based on the neutral point of the Satisfaction with Life Scale (20-point score). Answers from the groups were compared using the Mann-Whitney U-test for continuous and ordinal variables and Chi-square tests for categorical variables. Logistic regression analyses were used to examine the association between infertility-related factors and life satisfaction.

## Results

Regrets over the delay in childbearing decision were significantly higher in the low life satisfaction group than the high life satisfaction group ( $p = 0.010$ ); it was also negatively associated with life satisfaction (adjusted Odds Ratio = 0.85, 95% confidence interval = 0.74-0.97,  $p = 0.020$ ). Further, life satisfaction was positively associated with previous live birth (adjusted Odds Ratio = 2.84, 95% confidence interval = 1.38-5.85,  $p = 0.005$ ).

## Conclusions

To reduce their regret over their decision-making related to childbearing, women and men seeking fertility treatment should be cared for by health professionals. Moreover, reproductive-aged women and men need to make informed decision-making about the timing of childbearing to avoid, later in life, feelings of regret over delayed decisions, mainly because not regretting such an important aspect of life is crucial to allow people to live a satisfying life.

# Background

Life satisfaction is defined as “a global assessment of a person’s quality of life according to one’s own chosen criteria” [1]; it also is a component of subjective well-being as well as positive and negative affect [2]. Life satisfaction has a cognitive judgmental aspect, and such judgement over one’s own life satisfaction is usually based on a comparison with a standard which each individual sets for her or himself [3]. Further, people evaluate their life satisfaction based on their own values [4], regardless of sociodemographic variables such as age, sex, education, employment or income [5, 6].

Women and men seeking fertility treatment tend to value parenthood on their lives. Previous studies have reported that life satisfaction scores of women who were not able to have a child after undergoing a fertility treatment were significantly lower than those of women who were able [7]. In a study with women undergoing infertility treatment, researchers found negative outcomes associated with low life satisfaction, such as anxiety, depression and irritation [8]. In a study with men 5 years after a diagnosis of infertility, those who had not become fathers had poorer mental health than those who had become, and, as their life satisfaction scores diminished, their mental health also diminished [9]. These findings suggest that infertility can reduce life satisfaction.

Additionally, previous qualitative studies reported that women and men who have had delayed the timing of childbearing decision experience regret related to this delay [10–12]. In some developed countries, women and men alike have reported intention to postpone childbearing [13]. However, advanced maternal and paternal age is associated with higher rates of infertility [14]. As a result, delayed childbearing causes involuntary childlessness and families that are smaller than desired.

Given the aforementioned literature reports on the life satisfaction and regret feelings of infertile women and men, an important aspect of their lives may relate to the timing of the decision on childbearing, mainly because this may directly relate to an absence of regret over

their past decisions, which is an essential component of life satisfaction [15]. However, currently, there is little information about the association between life satisfaction and regret over the delay in childbearing decision.

Thus, we aimed to examine the association between infertility-related factors, including regret over the delay in childbearing decision and life satisfaction, among Japanese women and men seeking fertility treatment. Further, this study hypothesized that regret over the delay in childbearing decision would be negatively associated with life satisfaction.

## Methods

### Study design and participants

This cross-sectional study was conducted from July to December 2018. We recruited couples seeking fertility treatment from the fertility facilities that had been designated to the fertility treatment support project by the Ministry of Health, Labour and Welfare, Japan. To utilize a sample that was representative of the general Japanese population of couples seeking for fertility treatment, we selected four facilities in East and five in West Japan. Taking into consideration the ethics involved in the conduction of research with human subjects, we chose to exclude facilities which did not have a fertility counselor certified by the Japan Society for Infertility Counseling. With the intent to avoid participants' psychological burden regarding answering this study's questionnaire, we asked for the fertility counselors who got in contact with prospect participants to carefully explain the intentions of our study.

Of the 1282 women and men recruited, 449 completed the survey, including 253 women and 196 men. Overall, the valid response rate was 35.3%; women's rate was 39.5% and men's was 30.6%.

### Measures

Life satisfaction was measured through the Satisfaction with Life Scale (SWLS) developed by Diener et al. to measure people's cognitive judgments regarding their satisfaction with their own lives [3]. This scale consists of five items, as follows: (1) "In most ways, my life is close to my ideal," (2) "The conditions of my life are excellent," (3) "I am satisfied with my life," (4) "So far, I have gotten the important things I want in life" and (5) "If I could live my life over, I would change almost nothing." Respondents are asked to answer each item based on a scale that ranged from 1 (Strongly disagree) to 7 (Strongly agree). A score is obtained by the total sum of all items scores, and they range from 5 to 35, with higher scores indicating greater life satisfaction and a score of 20 representing the neutral point of the scale [3, 16]. The Japanese version of the SWLS was available for free-of-charge download on the website provided by Diener [17].

The degree of regret over the delay in childbearing decision was measured through the question, "Would you like to have made your childbearing decision at an earlier time in your life?" Participants responded to the question using a seven-point Likert scale that ranged from strongly disagree to strongly agree (the full range of this scale is demonstrated within Table 2 of Additional File 1).

We also had items regarding sociodemographic and infertility-related characteristics: for the first, they were age, sex, education, employment status and annual household income (see Table 1 for a full reference on the possible answers to these items); for the latter, they were whether or not they had previous live birth, used assisted reproductive technology and infertility duration.

### Procedures

Fertility counselors or the researcher (the first author of this study) explained the intentions of the study to patients who came to the fertility facilities, provided them with written information about the study and an informed consent form. Individuals who provided written consent received two copies of the questionnaire, one for oneself and the other for their partner. The questionnaires were to be taken and responded at home and returned by mail within two weeks.

### Statistical Analyses

We divided participants into two groups (low and high life satisfaction groups) based on the neutral point of the SWLS (20-point score; those below 19 were the low, and those above 20 were the high life satisfaction group). Data were presented as frequencies and percentages for categorical variables or median and interquartile range for continuous variables. Chi-square tests or the Mann-Whitney U test were used to explore the association between life satisfaction and participants' characteristics. Logistic regression analyses were

used to examine the association between life satisfaction and infertility-related factors (degree of regret, infertility duration, previous live birth and used assistant reproductive technology) with adjustment for age, sex, education, employment status and annual household income.

An appropriate sample size was based on logistic regression analyses that required a sample 10 times the number of independent variables. With an expected rate for people with low life satisfaction at 20%, we required data of 450 individuals to appropriately perform multiple logistic regression with the nine variables. In order to allow for possible response rate 35%, we planned to recruit 1286 people. Data were analyzed by the IBM SPSS Statistics for Windows version 25.0 (IBM Corporation, Tokyo, Japan), and the level of significance was set at  $p < 0.05$ .

## Results

### Life satisfaction and participants' characteristics

Table 1 shows participants' characteristics by life satisfaction score groups. Participants who had a child were more satisfied with their lives than those who did not have a child ( $\chi^2 = 6.949$ ,  $p = 0.008$ ).

Table 1 Participants' characteristics by life satisfaction score groups

	Low life satisfaction group <sup>a</sup> (n = 133)	High life satisfaction group <sup>b</sup> (n = 316)	p value
Age, years	35.0 (30.0, 39.0)	35.0 (32.0, 40.0)	0.051 <sup>c</sup>
Sex			
Female	84 (63.2)	169 (53.5)	0.059 <sup>d</sup>
Male	49 (36.8)	147 (46.5)	
University education			
No	66 (49.6)	146 (46.2)	0.507 <sup>d</sup>
Yes	67 (50.4)	170 (53.8)	
Employment status			
Full-time employment, Self-employed	86 (64.7)	228 (72.2)	0.286 <sup>d</sup>
Part-time employment	27 (20.3)	51 (16.1)	
Unemployed	20 (15.0)	37 (11.7)	
Annual household income			
< 6 million JPY	58 (43.6)	119(37.7)	0.239 <sup>d</sup>
6 ≤ million JPY	75 (56.4)	197 (62.3)	
Previous live birth			
No	122 (91.7)	259 (82.0)	0.008 <sup>d</sup>
Yes	11 (8.3)	57 (18.0)	
Used assisted reproduction technology			
No	85 (63.9)	214 (67.7)	0.434 <sup>d</sup>
Yes	48 (36.1)	102 (32.3)	
Infertility duration	24 (14, 36)	21 (12, 36)	0.184 <sup>c</sup>
Data are presented as number (percentage) or median (interquartile range).			
<sup>a</sup> Low life satisfaction group: participants with score of 19 or less in the Satisfaction with Life Scale			
<sup>b</sup> High life satisfaction group: participants with score of 20 or more in the Satisfaction with Life Scale			
<sup>c</sup> Mann-Whitney U test			
<sup>d</sup> Chi-square tests			

## Life satisfaction and regret over the delay in childbearing decision

An additional table file (Table 2 in Additional File 1) shows participants' answer ratios for the regret over the delay in childbearing decision scale by life satisfaction scores groups. Results indicated that 53.9% of the participants regretted their decision; the number of "agree" and "strongly agree" answers were 97 (21.6%) and 145 (32.3%), respectively. Among participants with low life satisfaction, the percentage of those who answered "strongly agree" was 45.1%, while participants with high life satisfaction had such percentage number at 26.9%. Overall, the degree of regret among the low life satisfaction group was significantly higher than that among the high life satisfaction group (median: 6, interquartile range: 4, 7 vs. median: 6, interquartile range: 4, 7,  $p = 0.010$ ).

Table 2  
Regret over the delay in childbearing decision scale item ratios by life satisfaction scores groups

	total (%)	Strongly disagree n (%)	Disagree n (%)	Somewhat disagree n (%)	Neither agree nor disagree n (%)	Somewhat agree n (%)	Agree n (%)	Strongly agree n (%)	Median (Interquartile range)	p value
Low life satisfaction group <sup>a</sup>	133 (29.6)	2 (1.5)	7 (5.3)	9 (6.8)	18 (13.5)	14 (10.5)	23 (17.3)	60 (45.1)	6 (4, 7)	0.010 <sup>c</sup>
High life satisfaction group <sup>b</sup>	316 (70.4)	10 (3.2)	14 (4.4)	20 (6.3)	42 (13.3)	71 (22.5)	74 (23.4)	85 (26.9)	6 (4, 7)	
total	449 (100)	12 (2.7)	21 (4.7)	29 (6.5)	60 (13.4)	85 (18.9)	97 (21.6)	145 (32.3)		
<sup>a</sup> Low life satisfaction group: participants with score of 19 or less in the Satisfaction with Life Scale										
<sup>b</sup> High life satisfaction group: participants with score of 20 or more in the Satisfaction with Life Scale										
<sup>c</sup> Mann-Whitney U test										

## The association between life satisfaction and infertility-related factors

Table 3 shows the association between life satisfaction and infertility-related factors. Logistic regression analysis showed that regret (adjusted Odds Ratio: 0.85, 95% confidence interval: 0.74–0.97,  $p = 0.020$ ) and previous live birth (adjusted Odds Ratio: 2.84, 95% confidence interval: 1.38–5.85,  $p = 0.005$ ) significantly associated with life satisfaction.

Table 3 Logistic regression analysis assessing the association between life satisfaction and infertility-related factors

	$\beta$ -Coefficient	Standard error	Odds Ratio (95% confidence interval)	p value
Regret (Each additional one-point Likert scale)	-0.17	0.07	0.85 (0.74–0.97)	0.020
Duration of infertility (each additional month longer)	0.01	0.01	1.01 (0.10–1.02)	0.233
Previous live birth (reference: no previous live birth)	1.04	0.37	2.84 (1.38–5.85)	0.005
Used assisted reproduction technology (reference: not used assisted reproduction technology)	-0.48	0.24	0.62 (0.39–1.00)	0.051
Adjusted by sex, age, education, employment status and annual household income				

## Discussion

This cross-sectional study aimed to investigate infertility-related factors associated with life satisfaction among Japanese women and men seeking fertility treatment. Results supported our hypothesis, as it showed an association between life satisfaction and regret over the delay in childbearing decision. Additionally, experiencing a previous live birth positively associated with life satisfaction.

Among all participants, 32.3% answered “strongly agree” about their degree of regret over the delay in childbearing decision. People’s regret arises from the contrast between a negative outcome that happened owing to a wrong decision and an alternative better outcome which might have happened in case another decision had been made [18, 19]. A previous study reported that women seeking for fertility treatment regretted their decision against childbearing when they should have, instead, chosen to conceive a child [20]. Similarly,

participants in our study regretted the fact that, at the time of this study, they could already have had children if they had not chosen against childbearing in the past.

In the descriptive analysis of degree of regret, 45.1% of the low life satisfaction group responded “strongly agree,” while 26.9% of the high life satisfaction group responded “strongly agree.” Life satisfaction refers to the degree to which a person positively evaluates one’s life, and it represents how much the person likes the life she/he leads [21]. Our results suggested that regret over the delay in childbearing decision was negatively associated with life satisfaction. Thus, since regret is dependent upon a comparison with an alternative behavior/situation that is thought to be appropriate, we believe it may be important to know what would be an appropriate behavior/situation regarding childbearing, and how to achieve it. Previous qualitative interviews reported that participants’ regret for delaying to find the right partner or putting their childbearing decision on hold to achieve a successful career owed to a lack of information about age-related infertility [11]. This denotes that more knowledge and information on the process of human fertility could have made it possible for them to attempt conception earlier in life, then allowing the avoidance of such regret feelings.

Our results showed that previous live birth was a positive factor that influenced life satisfaction. In a Japanese survey applied to both men and women aged between 18 to 49 years, researchers found that, regardless of marital status (married or unmarried), the most common reason for participants to have children was “Having children makes life pleasing and plentiful” [22]. Additionally, a research performed in Portugal with childless women and men (randomly recruited) aged between 18 to 45 years showed that, among the participants, 99.5% wanted to have children in the future and 61.7% reported that having children would positively contribute to life satisfaction [23]. Nevertheless, another study showed that it cannot be said that parents are happier than nonparents, mainly because well-being is influenced by many variables that include characteristics from both parent and child [24]. Although there seems to not be a wide consensus regarding the topic, our study still showed that achieving parenthood had a positive impact on life satisfaction for Japanese women and men seeking fertility treatment.

Several studies have found that reproductive-aged women and men deem important to complete their education, have financial security and a stable relationship before taking on the responsibility of parenthood [25–27]. Further, delaying childbearing decision to pursue personal aspirations confers benefits to the individual [28], even if the chance of having a child decreases with age. Thus, it may be important to focus on the fact that delaying childbearing decision - or even one’s infertility situation/condition - are not wrong or bad behaviors or decisions. However, it was a problem that an education starting in adolescence, which mainly focused on pregnancy prevention, caused misunderstanding “it’s so easy to get pregnant” [11]. Additionally, another study showed that participants believed that fertility treatment could overcome the effects of age that relate to infertility [25]. We would like to denote that importance in this subject should be placed on informed decision-making about the timing of childbearing.

This study has two clinical implications. The first one is that, to reduce their feeling of regret related to their past decisions on childbearing, health professionals need to care for patients; psychosocial counseling has been recommended as an essential component of fertility treatment [29, 30], mainly because such treatment places psychological and physical burden on patients. Our results suggested that reducing the feeling of regret through counseling may have a positive impact on life satisfaction. Every patient has her or his personal history and characteristics, so health professionals need to respect what the patients had achieved before planning pregnancy and try to reduce their negative affective feelings such as their regret. Further, fertility treatment carries no guarantee of achieving parenthood, and around 30% of the patients do not achieve it [31, 32]. Therefore, reducing the feeling of regret during the treatment process is also important to allow them to keep on living satisfying lives even if they end the treatment without achieving parenthood.

The second one is that health professionals need to encourage women and men to start thinking about their parenthood, and its timing, from an earlier age. An international survey noted that people’s choice to delay their childbearing decision owes to a lack of fertility knowledge - such as lack of understanding regarding age-related infertility - and risk factors that affect fertility [33]. Thus, reproductive education should place equal importance at both ends: it should allow for young women and men to grow up understanding not only how to prevent undesired pregnancy but also how to protect their fertility and achieve parenthood when they desire. A previous study showed that, when people make the best-informed possible decision, they are able to justify their decisions, even if the outcome is not the one that they hoped for [34]. Hence, to allow for people to live a satisfying life without major regrets at its later stages, it may be necessary to provide women and men with a better informed and satisfying reproductive life plan.

Finally, we considered that the regret coming from one’s delay in childbearing decision is not only a problem that comes from within the individual but also a social one. Faced with this, we see a need to overcome important challenges: to prevent people’s regrets related to delayed childbearing decision and involuntary childlessness, health professionals should try to avoid extending medical solutions (such

as assisted reproduction technology), and the social environment should provide reproductive-aged women and men with the opportunity to start a family earlier in life without the need to sacrifice their careers, academic goals and life expectations in order to do so [13, 35]. Therefore, there is a need to extend public awareness about the impact of the delay in childbearing decision to limit the increasing prevalence of infertility within the Japanese society.

This study has many limitations, but we deem that two should be noted. First, this study was a cross-sectional study, so we cannot infer the temporal associations between regret over the delay in childbearing decision and life satisfaction. Second, this study was limited to Japanese women and men who were seeking fertility treatment, so the findings cannot be generalized to the other populations. Further study with general population should be explored in the future.

## Conclusions

People's regret over the delay in childbearing decision was found to be negatively associated with life satisfaction. Contrastingly, previous live birth was positively associated with life satisfaction. Our study showed that women and men need to make better informed decision-making about the timing of childbearing to not regret over the delay in childbearing decision later in life; additionally, it is important for reproductive-aged women and men who desire to be parents to have the opportunity to start a family earlier in life and to live a satisfying life, without having to sacrifice their other life expectations to have children.

## Abbreviations

SWLS  
Satisfaction with Life Scale

## 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 purposes and methods of this study and gave their written consent.

### Consent for publication

Additionally to consent for participation, the written consent form included information on consent for publication, and all participants signed such form.

### 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.

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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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## References

1. Shin DC, Johnson DM. Avowed happiness as an overall assessment of the quality of life. *Soc Indic Res.* 1978;5(1-4):475–92. doi:1007/BF00352944.
2. Lucas RE, Diener E, Suh E. Discriminant validity of wellbeing measures. *J Pers Soc Psychol.* 1996;71(3):616–28. doi:10.1037/0022-3514.71.3.616.
3. Diener E, Emmons RA, Larsen RJ, Griffin S. The satisfaction with life scale. *J Pers Assess.* 1985;49:71–5. doi:10.1207/s15327752jpa4901\_13.
4. Diener E, Suh EM, Lucas RE, Smith HL. Subjective well-being: three decades of progress. *Psychol Bull.* 1999;125(2):276–302.
5. Myers DG, Diener E. Who is happy? *Psychol Sci.* 1995;6(1):10–9. doi:10.1111/j.1467-9280.1995.tb00298.x.
6. Kahneman D, Krueger AB, Schkade D, Schwarz N, Stone AA. Would you be happier if you were richer? A focusing illusion. *Science.* 2006;312(5782):1908–10. doi:10.1126/science.1129688.
7. Hammarberg K, Astbury J, Baker H. Women's experience of IVF: a follow-up study. *Hum Reprod.* 2001;16(2):374–83. doi:10.1093/humrep/16.2.374.
8. Dembińska AA. Psychological determinants of life satisfaction in women undergoing infertility treatment. *Heal Psychol Rep.* 2016;4(2):146–58. doi:10.5114/hpr.2016.56617.
9. Fisher JR, Baker GH, Hammarberg K. Long-term health, well-being, life satisfaction, and attitudes toward parenthood in men diagnosed as infertile: challenges to gender stereotypes and implications for practice. *Fertil Steril.* 2010;94(2):574–80. doi:10.1016/j.fertnstert.2009.01.165.
10. Loke AY, Yu PL, Hayter M. Experiences of sub-fertility among Chinese couples in Hong Kong: a qualitative study. *J Clin Nurs.* 2012;21(3-4):504–12. doi:10.1111/j.1365-2702.2010.03632.x.
11. Mac Dougall K, Beyene Y, Nachtigall RD. Age shock: misperceptions of the impact of age on fertility before and after IVF in women who conceived after age 40. *Hum Reprod.* 2013;28(2):350–6. doi:10.1093/humrep/des409.
12. Koert E, Daniluk JC. When time runs out: reconciling permanent childlessness after delayed childbearing. *J Reprod Infant Psychol.* 2017;35(4):342–52. doi:10.1080/02646838.2017.1320363.
13. Mills M, Rindfuss RR, McDonald P, te Velde E. Why do people postpone parenthood? Reasons and social policy incentives. *Hum Reprod Update.* 2011;17(6):848–60. doi:10.1093/humupd/dmr026.
14. Practice Committee of the American Society for Reproductive Medicine in collaboration with the Society for Reproductive Endocrinology and Infertility. Optimizing natural fertility: a committee opinion. *Fertil Steril.* 2017;107:52–8. doi:10.1016/j.fertnstert.2016.09.029.
15. Margolis S, Schwitzgebel E, Ozer DJ, Lyubomirsky S. A new measure of life satisfaction: the Riverside Life Satisfaction Scale. *J Pers Assess.* 2019;101(6):621–30. doi:10.1080/00223891.2018.1464457.
16. Pavot W, Diener E. The Satisfaction With Life Scale and the emerging construct of life satisfaction. *J Posit Psychol.* 2008;3(2):137–52. doi:10.1080/17439760701756946
17. Diener E. Satisfaction With Life Scale (SWLS), Japanese. In: SWLS translations. <http://labs.psychology.illinois.edu/~ediener/SWLS.html>. Accessed 5 Nov 2019.
18. Gilovich T, Medvec VH. The experience of regret: what, when, and why. *Psychol Rev.* 1995;102(2):379–95. doi:10.1037/0033-295X.102.2.379.
19. Zeelenberg M, van Dijk WW, Manstead ASR, van der Pligt J. On bad decisions and disconfirmed expectancies: the psychology of regret and disappointment. *Cogn Emot.* 2000;14(4):521–41. doi:10.1080/026999300402781.
20. Cooke A, Mills TA., Lavender T. Advanced maternal age: delayed childbearing is rarely a conscious choice: a qualitative study of women's views and experiences. *Int J Nurs Stud.* 2012;49(1):30–9. doi:10.1016/j.ijnurstu.2011.07.013.
21. Veenhoven R. The study of life-satisfaction. In: Saris WE, Veenhoven R, Scherpenzeel, AC, Bunting B, editors. *A comparative study of satisfaction with life in Europe*. Budapest: Eötvös University Press; 1996. p. 11–48.
22. National Institute of Population and Social Security Research. Marriage and childbirth in Japan today: the fifteenth Japanese national fertility survey, 2015 (Results of Singles and Married Couples Survey). [http://ipss.go.jp/ps-doukou/j/doukou15/NFS15\\_reportALL.pdf](http://ipss.go.jp/ps-doukou/j/doukou15/NFS15_reportALL.pdf). Accessed 5 Nov 2019.
23. Almeida-Santos T, Melo C, Macedo A, Moura-Ramos M. Are women and men well informed about fertility? Childbearing intentions, fertility knowledge and information-gathering sources in Portugal. *Reprod Health.* 2017;14:91. doi:10.1186/s12978-017-0352-z.

24. Nelson SK, Kushlev K, Lyubomirsky S. The pains and pleasures of parenting: when, why, and how is parenthood associated with more or less well-being? *Psychol Bull.* 2014;140(3):846–95. doi:10.1037/a0035444.
25. Southby C, Cooke A, Lavender T. 'It's now or never'-nulliparous women's experiences of pregnancy at advanced maternal age: a grounded theory study. *Midwifery.* 2019;68:1–8. doi:10.1016/j.midw.2018.09.006.
26. Maheshwari A, Porter M, Shetty A, Bhattacharya S. Women's awareness and perceptions of delay in childbearing. *Fertil Steril.* 2008;90(4):1036–42. doi:10.1016/j.fertnstert.2007.07.1338.
27. Lampic C, Svanberg AS, Karlström P, Tydén T. Fertility awareness, intentions concerning childbearing, and attitudes towards parenthood among female and male academics. *Hum Reprod.* 2006;21(2):558–64. doi:10.1093/humrep/dei367.
28. Tough S, Tofflemire K, Benzies K, Fraser-Lee N, Newburn-Cook C. Factors influencing childbearing decisions and knowledge of perinatal risks among Canadian men and women. *Matern Child Health J.* 2007;11(2):189–98. doi:10.1007/s10995-006-0156-1.
29. Boivin J. A review of psychosocial interventions in infertility. *Soc Sci Med.* 2003;57(12):2325–41. doi:10.1016/s0277-9536(03)00138-2.
30. Read SC, Carrier ME, Boucher ME, Whitley R, Bond S, Zelkowitz P. Psychosocial services for couples in infertility treatment: what do couples really want? *Patient Educ Couns.* 2014;94(3):390–5. doi:10.1016/j.pec.2013.10.025.
31. Pinborg A, Hougaard CO, Nyboe Andersen A, Molbo D, Schmidt L. Prospective longitudinal cohort study on cumulative 5-year delivery and adoption rates among 1338 couples initiating infertility treatment. *Hum Reprod.* 2009;24(4):991–9. doi:10.1093/humrep/den463.
32. Troude P, Santin G, Guibert J, Bouyer J, de La Rochebrochard E. Seven out of 10 couples treated by IVF achieve parenthood following either treatment, natural conception or adoption. *Reprod Biomed Online.* 2016;33(5):560–7. doi:10.1016/j.rbmo.2016.08.010.
33. Bunting L, Tsibulsky I, Boivin J. Fertility knowledge and beliefs about fertility treatment: findings from the International Fertility Decision-making Study. *Hum Reprod.* 2013;28(2):385–97. doi:10.1093/humrep/des402.
34. Connolly T, Zeelenberg M. Regret in decision making. *Curr Dir Psychol Sci.* 2002;11(6):212–5.
35. Lemoine ME, Ravitsky V. Sleepwalking into infertility: the need for a public health approach toward advanced maternal age. *Am J Bioeth.* 2015;15(11):37–48. doi:10.1080/15265161.2015.1088973.