Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 6, 3421-3429
2024
Publisher: Learning Gate
DOI: 10.55214/25768484.v8i6.2721

Predicting factors for social oocyte cryopreservation intention among unmarried Korean women

Sung Hee Lee[1], Ji Woo Baek[2], Yeong Ju Lee[3], Ki Hoon Choi[4], Yu Jin Choi[5], Si Eun Ha[6], Hyo Won Choi[7], Jung A Kim[8*]
[1]Professor, College of Nursing, Kyungpook National University, Republic of Korea; leesh@knu.ac.kr (S.H.L.).
[2,3,4,5,6,7]Undergraduate Student, College of Nursing, Kyungpook National University, Republic of Korea; orwldn0526@naver.com (J.W.B.) dldoduk8660@naver.com (Y.J.L.) john07102@naver.com (K.H.C.) rhel8888@naver.com (Y.J.C.) seha2003@naver.com (S.E.H.) gydnjs4623@naver.com (H.W.C.).
[8]Doctoral Candidate, College of Nursing, Kyungpook National University, Republic of Korea; kimjunga2008@gmail.com (J.A.K.).

Abstract: In 2023, the average age of Korean women for the first marriage and giving birth was reported to 31.45 and 33.6, respectively. Due to the late marriage, the number of patients undergoing infertility treatment per 100,000 in Korea increased by 16.9% over the past five years to 27.3. Recently, interest in social oocyte cryopreservation (SOC) has been growing in Korea as a strategy to address the low birth rate. This study is descriptive research to determine the influence of unmarried women's knowledge of fertility preservation, tendency toward late marriage, and awareness of fertility preservation on intention to SOC. This study aims to identify predictors of unmarried women's intention to SOC. Data were collected from July 20 to 26, 2024, through a online self-reported survey from unmarried women in their 20s to 40s. 234 copies were collected, but 211 copies were used for the analysis after excluding 23 insincere responses. The data were analyzed using descriptive statistical analysis and logistic regression analysis using the SPSS/PC 29.0 program. In this study, 41.7% of unmarried women intended to SOC, while 58.3% did not. In addition, the intention to SOC was higher when they wanted children (p=.041, exp(B)=2.35), were aware of SOC (p=.015, exp(B)=2.98), and had a high awareness of fertility preservation (p<0.001, exp(B)=1.47). But the higher the tendency to marry late (p=.044, exp(B)=.92), the lower the intention to SOC. The findings can serve as foundational data to increase social awareness of SOC for unmarried women and to help develop supportive policies.

Keywords: *Cryopreservation, Fertility preservation, Intention, Oocyte, Unmarried.*

1. Introduction

In 2023, the total fertility rate of South Korea was 0.72, the lowest among OECD countries [1]. In addition, the average age of childbirth is 33.6 years owing to the influence of the late marriage trend among women [1]. Late marriage and older age at childbirth are associated with reduced fertility, and the number of patients receiving infertility treatment in South Korea has been reported to be 27.3 individuals per 100,000 population [2,3], representing an increase of 16.9% over the past five years [3]. In particular, the percentage of women receiving infertility treatment was highest among those aged 35–39 years [3]. However, the success rate of infertility treatment is fairly low at around 30% [4]. Consequently, the importance of preserving fertility and interest in oocyte cryopreservation for preserving fertility have been increasing recently among women [2].

Oocyte cryopreservation refers to the process of freezing oocytes to preserve them in preparation for reduced fertility. Women typically experience decline in fertility starting from the age of 35 years [2]. Hence, oocyte cryopreservation can be performed in preparation for aging-related decline in ovarian function [2]. Previously, oocyte cryopreservation was primarily used for the medical purpose of preparing for future pregnancies and childbirths among women who were undergoing medical

* Correspondence: kimjunga2008@gmail.com

treatments that may affect their fertility [2]. However, in recent years, there has been a tendency for women who have social reasons to delay having children to consider oocyte cryopreservation [5,6]. This phenomenon is referred to as social oocyte cryopreservation [2].

Oocyte cryopreservation at a younger age has been reported to enhance pregnancy and birth rates [2,7]. According to the 2020 data obtained from the Health Insurance Review and Assessment Service, 10.7% of all newborns were born through assisted reproduction technique [8]. To improve fertility rates, some local governments have been operating programs to subsidize the cost of such procedures, while the South Korean government is considering the expansion of related policies. Seoul was the first city in South Korea to start a program called the "Seoul Oocyte Cryopreservation Procedure Cost Support Program" for women aged 20–49 years who wished to preserve fertility for the purpose of future pregnancies and childbirths [9]. However, the factors that influence social oocyte cryopreservation intention have not been determined yet, which poses limitations in effectively establishing support policies. Therefore, in life planning, it is necessary to check for oocyte cryopreservation intention for having children in the future in people with possibility of late marriage.

Previous studies have found that the general characteristics of women, such as their age [10,11], education and income levels [11], opportunity cost, religion [12], and marriage and birth plans [13], affect their awareness of oocyte cryopreservation. Moreover, it has been reported that women who want more children have a higher intention level of using oocyte cryopreservation [14]. A previous study also reported that women who had their oocytes cryopreserved had access to information about oocyte cryopreservation beforehand [15].

Fertility-related knowledge refers to knowledge about the biological ability of women of childbearing potential to become pregnant and about oocyte cryopreservation [16]. According to a previous study, low fertility knowledge level influenced reproduction-related decision-making [16]. Moreover, it was reported that women with a lower level of fertility-related knowledge experienced difficulties in making decisions about choosing the treatment or procedure for preserving fertility [17]. However, no studies have been conducted on the effects of fertility preservation knowledge on social oocyte cryopreservation intention.

Late marriage refers to the trend of increasing age of first marriage. According to Statistics Korea, the average age of first marriage among Korean women was 31.45 years in 2023 [1], with marriage among women aged 30–49 years accounting for 53% of all marriages [1]. Previous studies reported that although the age standard for marriage among unmarried women had changed significantly, they did not have negative attitudes toward marriage or childbirth [18]. However, because of late marriage, women who want children can easily become infertile owing to decline in fertility [2]. Therefore, in life planning, it is necessary to check for oocyte cryopreservation intention for having children in the future in people with possibility of late marriage.

Awareness of fertility preservation refers to the level of awareness regarding preservation of fertility for childbearing. In previous studies, awareness of fertility preservation was reported to be low among college students [19,20]. However, as previous studies in South Korea investigated only college students, awareness levels of fertility preservation were not evaluated among unmarried women in other age groups. Individuals with awareness of fertility preservation should have interest in fertility preservation. However, the effects of differences in awareness of fertility preservation on oocyte cryopreservation intention have not been investigated in South Korea.

Among foreign studies on social oocyte cryopreservation, a study from England reported on not only the decision-making process for social oocyte cryopreservation, but also the period up to the subsequent childbirth outcomes using cryopreserved oocytes [21]. A study from Belgium investigated intention, knowledge, and attitude regarding social oocyte cryopreservation [17].

However, previous studies in South Korea regarding social oocyte cryopreservation have been cross-sectional studies that measured awareness and knowledge of oocyte cryopreservation among unmarried women who visited fertility preservation clinics and or that evaluated awareness of oocyte cryopreservation for preservation of the ability to become pregnant among unmarried women; no studies have conducted investigations considering various predicting factors [10,22].

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 6: 3421-3429, 2024
DOI: 10.55214/25768484.v8i6.2721

Therefore, this study aimed to determine the predictors of intention toward social oocyte cryopreservation, which is one of the methods for fertility preservation in the response policy to low birthrate. It is hoped that the findings of this study will be used to increase social awareness about oocyte cryopreservation and help in the establishment of support policies.

1.1. Objectives

This study aimed to identify fertility preservation knowledge, value of children, late marriage tendency, and fertility-related awareness as well as predicting factors of oocyte cryopreservation intention among unmarried women.

The specific objectives were as follows:

- Determine the level of oocyte cryopreservation intention among unmarried women.
- Determine the fertility preservation knowledge, late marriage tendency, and awareness of fertility preservation among unmarried women.
- Identify the predicting factors of social oocyte cryopreservation intention among unmarried women.

2. Methods

2.1. Study Design

This descriptive survey study aims to determine the predicting factors of social oocyte cryopreservation intention among unmarried women.

2.2. Sample Size

In this study, the inclusion criteria were unmarried women aged 20–49 years who could understand the objectives and procedures of the study and voluntarily consented to participate in the study. Unmarried women of foreign nationality who had difficulty understanding Korean or could not complete the self-reporting questionnaire on their own, women with a history of common-law marriage or cohabitation, and women with children were excluded from the study. The sample size was calculated using the G*power 3.1.9.7 program. Based on a two-sided test, an odds ratio of 1.5, a significance level (α) of 0.05, and power of 1-β 0.8, the sample size was calculated to be 209. The collected data comprised a total of 234 sets, and after excluding 23 sets with incomplete responses, a total of 211 sets was used in the analysis.

2.3. Instruments

2.3.1. Social Oocyte Cryopreservation Intention

With respect to social oocyte cryopreservation intention, the subjects chose "Have," "Maybe," "Not sure," or "Do not have" as their response to the question "Do you have any intention to cryopreserve your oocytes?" For data analysis, "Have" and "Maybe" were reclassified as "Yes" (group with positive attitude) and "Do not have" and "Not sure" were reclassified as "No" (group with negative attitude).

2.3.2. Expected Number of Children

With respect to expected number of children, the subjects chose "Do not want children," "1," "2," or "≥ 3" as their response to the question "How many children do you want?" For data analysis, "Do not want children" was reclassified as "No" and "1," "2," and "≥ 3" were reclassified as "Yes."

2.3.3. Awareness of Oocyte Cryopreservation

With respect to awareness of oocyte cryopreservation, the subjects chose "Yes" or "No" as their response to the question "Have you heard of or do you have interest in social oocyte cryopreservation?"

2.3.4. Fertility Preservation-Related Knowledge

With respect to fertility preservation-related knowledge, knowledge questions in the Fertility Preservation Survey (FPS) developed by J.C. Daniluk et al. (2016) were used [16]. The subjects chose

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 6: 3421-3429, 2024
DOI: 10.55214/25768484.v8i6.2721

"True" (T) or "False" (F) as their response to 12 knowledge questions. T was assigned 1 point and F was assigned 0 points for a total score ranging between 0 and 12 points, with higher scores indicating higher level of knowledge. Permission from the developer of the instrument was obtained prior to the study and bilingual translators (English and Korean) translated and backtranslated the instrument. The translated instrument was reviewed by a reviewer who majored in Korean language and literature. Subsequently, a preliminary survey was conducted on 11 unmarried women aged 20–39 years, and the instrument was used without any modification. In this study, the reliability was KR 20= .11.

2.3.5. Late Marriage Tendency

To measure late marriage tendency, the 14-item instrument developed by the Korean Women's Development Institute (2007) was used with permission from the developer [23]. The late marriage tendency scale consists of two domains: benefits of unmarried life and difficulties of unmarried life. Each item was rated on a 4-point Likert scale (1 point: "Not at all" to 4 points: "Very much so"), and negative items were reverse scored. The total score ranged between 14 and 56 points, with higher scores indicating higher late marriage tendency. In a previous study, an internal consistency value of ≥ .60 was reported for each factor [24]. In this study, Cronbach's α = .78.

2.3.6. Awareness of Fertility Preservation

Awareness of fertility preservation was measured using seven items from the Fertility Preservation Awareness scale developed by Stoop D (2011) and subsequently translated into Korean, modified, and updated by Hong et al. (2019) [22,25]. The items were used with permission obtained from the original developer and translator prior to the study. Each item was rated on a 4-point Likert scale (1 point: "Not at all" to 4 points: "Absolutely so"). The total score ranged between 7 and 28 points, with higher scores indicating greater awareness of fertility preservation. In this study, the internal consistency, Cronbach's α=.41.

2.4. Data Collection

In this study, candidates were recruited through recruitment announcements on websites (https://everytime.kr, https://cafe.naver.com/nursingstudies, and https://instagram.com) posted between July 20 and 26, 2024. The candidates were provided the option to consent to the survey at the beginning of the online questionnaire survey to provide their consent for study participation. The survey, consisting of 50 items, required approximately seven minutes to complete. Among the women who completed the survey, those who wished were entered into a random drawing for an online gift certificate, approximately $7.40 in value.

2.5. Ethics Statement

This study was approved by the Institutional Review Board (IRB) of Kyungpook National University (IRB approval number: 2024-0312).

2.6. Data Analysis

Collected data were analyzed using IBM SPSS Statistics version 29.0, as described below.

1) General characteristics, expected number of children, awareness of oocyte cryopreservation, and oocyte cryopreservation intention were analyzed by frequency and percentage.
2) Level of fertility preservation knowledge, late marriage tendency, and awareness of fertility preservation were identified by mean and standard deviation (SD).
3) Predictors of oocyte cryopreservation intention were analyzed using binomial logistic regression analysis.

3. Results

Among the subjects, 64.9% were aged 20–29 years, 48.8% were employed, and 66.8% earned a monthly income of < 2,500,000 won. Moreover, 69.2% graduated college or higher, 53.1% followed a

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 6: 3421-3429, 2024
DOI: 10.55214/25768484.v8i6.2721

religion, and 53.1% were currently in a relationship. Additionally, 73.5% wanted at least one child in the future and 77.3% had heard about social oocyte cryopreservation Table 1.

Table 1.
General characteristics (N = 211).

Variable	Category	n(%)
Age (years)	20–29	137(64.9)
	≥ 30	74(35.1)
Employed	Yes	103(48.8)
	No	108(51.2)
Monthly income (KRW)	< 2,500,000	141(66.8)
	≥ 2,500,000	70(33.2)
Education level	High school	65(30.8)
	College or higher	146(69.2)
Religion	Yes	112(53.1)
	No	99(46.9)
Currently in a relationship	Yes	112(53.1)
	No	99(46.9)
Expected number of children	Yes	155(73.5)
	No	56(26.5)
Awareness of social oocyte cryopreservation	Yes	163(77.3)
	No	48(22.7)

Table 2.
Level of social oocyte cryopreservation intention.

Cryopreservation intention	n (%)
No (Do not have, not sure)	123(58.3)
Yes (Have, maybe)	88(41.7)

The results show that 41.7% of the respondents have social oocyte cryopreservation intention and 58.3% do not (Table 2).

Table 3.
Fertility preservation knowledge, late marriage tendency, and fertility preservation awareness levels.

Variable	M± SD	Min.	Max.	Range
Fertility preservation knowledge	7.90±1.54	4	12	0–12
Late marriage tendency	39.47±4.99	28	55	14–56
Fertility preservation awareness	19.70±2.47	14	25	7–28

The scores for levels of fertility preservation knowledge, late marriage tendency, and fertility preservation awareness were 7.90±1.54, 39.47±4.99, and 19.70±2.74 points, respectively (Table 3).

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 6: 3421-3429, 2024
DOI: 10.55214/25768484.v8i6.2721

Table 4.
Influencing factors of social oocyte cryopreservation intention.

Variable	B	S.E.	Sig.	Exp(B)	95% CI lower-upper
Constant term	-5.96	2.32	0.010	0.00	
Age (20–29 years)	-0.29	0.43	0.633	0.81	0.34–1.91
Employment status (No)	0.78	0.43	0.505	0.74	0.31–1.76
Monthly income (< 2,500,000 won)	-0.15	0.48	0.103	2.19	0.85–5.63
Education (High school)	0.09	0.43	0.715	0.85	0.36–2.00
Religion (No)	-0.17	0.36	0.789	1.10	0.53–2.26
Currently in a relationship (No)	0.85	0.35	0.631	0.84	0.41–1.70
Expected number of children (Yes)	1.09	0.41	0.041	2.34	1.03–5.30
Awareness of social oocyte cryopreservation (Yes)	-0.06	0.45	0.015	2.98	1.23–7.22
Fertility preservation knowledge	-0.07	0.11	0.576	0.93	0.75–1.17
Late marriage tendency	0.38	0.03	0.044	0.92	0.86–.99
Fertility preservation awareness	-5.96	0.07	<0.001	1.47	1.26–1.71

This study investigated the effects of general characteristics, fertility preservation knowledge, late marriage tendency, and awareness of fertility preservation on social oocyte cryopreservation intention. The predicting factors of oocyte cryopreservation intention among unmarried women aged 20–49 years were found to be expected number of children, awareness of social cryopreservation, awareness of fertility preservation, and late marriage tendency. The expectation of having children was found to have a positive influence on oocyte cryopreservation intention. The expectation of having one child increased oocyte cryopreservation intention by 2.34 times (CI: 1.03–5.30, exp(B)=2.34, p=.041). Awareness of social oocyte cryopreservation also had a positive influence on oocyte cryopreservation intention; it increased oocyte cryopreservation intention by 2.98 times (CI: 1.23–7.22, exp(B)=2.98, p=.015). Awareness of fertility preservation increased social oocyte cryopreservation intention by 1.47 times (CI: 1.26~1.71, exp(B)=1.47, p<0.001). On the other hand, an increase in late marriage tendency reduced social oocyte cryopreservation intention by 1.08 times (CI: 0.86–0.99, exp(B)=.92, p=.044) (Table 4).

4. Discussion

This study aimed to identify the influencing factors of social oocyte cryopreservation intention among unmarried women. The findings of the study suggest that expectation of having children, awareness of social oocyte cryopreservation preservation, late marriage tendency, and awareness of fertility preservation are predictors of social oocyte cryopreservation intention among unmarried women.

The findings also revealed that 41.7% of unmarried women had social oocyte cryopreservation intention, whereas 58.3% did not. This result was consistent with the results of a previous study that reported 41% positive and 58% negative responses from unmarried women with respect to social oocyte cryopreservation intention to preserve their ability to become pregnant in the future [10]. Among the general characteristics, women with expectation of having children had higher social cryopreservation intention. A previous study reported that some women who want children in the future wanted oocyte cryopreservation because of the delay in marriage due to various reasons, such as career advancement, no spouse at the time, and economic burden of raising a child [26]. Such findings indicate that the likelihood of having children can be increased through support for social oocyte cryopreservation, suggesting the need to expand oocyte cryopreservation support policies.

Women with awareness of social oocyte cryopreservation had higher social oocyte cryopreservation intention. This finding was consistent with previous studies on women in England and Denmark aged

18–64 years, which reported that oocyte cryopreservation intention was higher when information about oocyte cryopreservation was available [27]. Moreover, a study in Singapore reported that 70% of female medical school students who heard about social cryopreservation considered oocyte cryopreservation [28]. Therefore, awareness of social oocyte cryopreservation must be raised to increase social oocyte cryopreservation intention. In this study, 60.2% of the subjects reported that they became aware of social oocyte cryopreservation through mass media, such as TV, radio, and Internet. Therefore, accurate information about social oocyte cryopreservation must be provided to unmarried women through mass media to enable them to make the right decision about oocyte cryopreservation [2].

Women with higher awareness of fertility preservation had social oocyte cryopreservation intention. Awareness is a fundamental step in the decision-making process, as acquiring and using the right information enables people to make rational decisions [29]. It was determined that the subjects in this study had social oocyte cryopreservation intention based on proper understanding of fertility preservation. Meanwhile, many Korean women are interested in fertility preservation, but their levels of awareness and knowledge of oocyte cryopreservation are somewhat low [22]. Therefore, the knowledge level of subjects should be considered when providing information and counseling for improving awareness [22].

Unexpectedly, women with a high tendency toward late marriage showed lower social oocyte cryopreservation intention. Previous studies found that highly educated, professional women with delayed marriages were interested in oocyte cryopreservation and had oocyte cryopreservation intention [10,17]. In contrast, the subjects in this study included many women aged 20–29 years who were unemployed or earned a low income. The years between the ages of 20 and 29 represent a period when people seek to fulfill certain tasks such as marriage and pregnancy, but the study subjects were unable to make specific plans because they earned no or low income [30–32]. In other words, people aged 20–29 years tend to show late marriage tendency with no actual plan for pregnancy, unlike people aged 30–49 years. Consequently, the results showed a high tendency toward late marriage, but low oocyte cryopreservation intention.

In this study, age, education, religion, employment, monthly income, and relationship status did not have significant influences on social oocyte cryopreservation intention. Women aged 20–29 years accounted for the highest percentage of subjects in this study (64.9%), as convenience sampling was used. Consequently, the general characteristics of unmarried women aged 30–49 years were not reflected well in the results. Therefore, future studies with subjects of diverse age groups are warranted. Moreover, fertility preservation-related knowledge did not influence social oocyte cryopreservation intention [16]. In this study, a knowledge scale developed in Canada was translated and backtranslated for use in a preliminary survey. However, sociocultural differences between Canada and South Korea may not have been reflected, and as a result, there may have been limitations in assuring the validity of the scale. Moreover, its reliability was low in this study, with KR 20 = .11. This scale was developed for women visiting infertility clinics. Therefore, it may have limitations in measuring fertility preservation-related knowledge among regular unmarried women. In the future, replication studies using a fertility preservation knowledge scale with proven validity and reliability are needed.

Previous South Korean studies that investigated social oocyte cryopreservation intention were mostly conducted on women who visited infertility clinics [10,22]. This study is significant in that it is the first attempt to investigate social oocyte cryopreservation intention among regular unmarried women. However, one limitation of this study is that, because the subjects were convenience sampled, the findings cannot be generalized for all unmarried women in South Korea.

5. Conclusion

This study was conducted to identify the predictors of social oocyte cryopreservation intention among unmarried women and use the findings as foundational data for raising social awareness about social oocyte cryopreservation among unmarried women and establishing support policies. The findings showed that the predictors of social oocyte cryopreservation intention among unmarried women were expectation of having children, awareness of social oocyte cryopreservation, late marriage tendency, and

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 6: 3421-3429, 2024
DOI: 10.55214/25768484.v8i6.2721

awareness of fertility preservation. Based on these findings, the following recommendations can be suggested.

First, replication studies with measurement instruments of greater validity and reliability are needed.

Second, studies with random sampling are needed to generalize the findings.

Third, it is necessary to establish oocyte cryopreservation support policies and assess their effectiveness with consideration of the predicting factors of social oocyte cryopreservation intention among unmarried women.

References

[1] Korean Statistical Information Service, "Population census," Retrieved: https://kostat.go.kr/statDesc.es?act=view&mid=a10501010000&sttr_cd=S001008.

[2] D. Y. Lee and Y. J. Kim, "Planned oocyte cryopreservation for fertility preservation," Journal of the Korean Medical Association, vol. 65, no. 6, pp. 353–360, Jun. 2022, https://doi.org/10.5124/jkma.2022.65.6.353.

[3] Korea Health Insurance Review & Assessment Service, "Analysis of the status of infertility and subfertility treatment," 2023, Retrieved: https://www.hira.or.kr/bbsDummy.do?pgmid=HIRAA020041000100&brdScnBltNo=4&brdBltNo=10880&pageIndex=1&pageIndex2=1.

[4] Yonhap News Agency, "Infertile couples have a '30 percent chance' of getting pregnant if they get help paying for treatment," Retrieved: https://www.yna.co.kr/view/AKR20231006064700530.

[5] H. A. Lee and E. J. Jung, "Is 'social egg freezing' ethical?," The Women's Studies, pp. 67–105, 2022.

[6] H. Y. Kim and S. W. Kim, "History of fertility preservation," Journal of the Korean Medical Association, vol. 65, no. 6, pp. 322–328, 2022, https://doi.org/10.5124/jkma.2022.65.6.322.

[7] N. Noyes, E. Porcu, and A. Borini, "Over 900 oocyte cryopreservation babies born with no apparent increase in congenital anomalies," Reproductive BioMedicine Online, vol. 18, no. 6, pp. 769-776, 2009, https://doi.org/10.1016/S1472-6483(10)60025-9.

[8] D. Y. Lee, "Development of national infertility treatment statistics management model," Health Insurance Review and Assessment Research Institue, 2022.

[9] Seoul Metropolitan Government City News, "Project to support for the egg freezing cost to kick off," Retrieved: https://english.seoul.go.kr/project-to-support-for-the-egg-freezing-cost-to-kick-off/.

[10] H. S. Joe and H. O. Kim, "Acceptance of oocytes freezing for fertility preservation for social reasons among unmarried korean women," Journal of Korean Maternal and Child Health, vol. 21, no. 1, pp. 46–54, 2017, https://doi.org/10.21896/jksmch.2017.21.1.46.

[11] M. Giannopapa, A. Sakellaridi, A. Pana, and V. S. Velonaki, "Women electing oocyte cryopreservation: Characteristics, information sources, and oocyte disposition: A systematic review," Journal of Midwifery & Women's Health, vol. 67, no. 2, pp. 178-201, 2022, https://doi.org/10.1111/jmwh.13332.

[12] G. Ghazeeri, C. Beyrouthy, L. El-Taha, M. Abiad, and D. Fahs, "Knowledge & attitudes toward fertility preservation (medical and social freezing) among Lebanese women between the ages of 18 and 39 years," Public Library Of Science One, vol. 18, no. 9, pp. e0291249, 2023, https://doi.org/10.1371/journal.pone.0291249.

[13] M. Simopoulou et al., "Postponing pregnancy through oocyte cryopreservation for social reasons: Considerations regarding clinical practice and the socio-psychological and bioethical issues involved," Medicina, vol. 54, no. 5, p. 76, 2018, https://doi.org/10.3390/medicina54050076.

[14] S. D. Cascante, A. S. Berkeley, F. Licciardi, C. McCaffrey, and J. A. Grifo, "Planned oocyte cryopreservation: The state of the ART," Reproductive BioMedicine Online, vol. 47, no. 6, 2023, https://doi.org/10.1016/j.rbmo.2023.103367.

[15] B. Hodes-Wertz, S. Druckenmiller, M. Smith, and N. Noyes, "What do reproductive-age women who undergo oocyte cryopreservation think about the process as a means to preserve fertility?," Fertility and Sterility, vol. 100, no. 5, pp. 1343-1349, 2013, https://doi.org/10.1016/j.fertnstert.2013.07.201.

[16] J. C. Daniluk and E. Koert, "Childless women's beliefs and knowledge about oocyte freezing for social and medical reasons," Human Reproduction, vol. 31, no. 10, pp. 2313–2320, 2016, https://doi.org/10.1093/humrep/dew189.

[17] L. M. Roberts, R. Kudesia, H. Zhao, S. Dolan, and M. Rose, "A cross-sectional survey of fertility knowledge in obstetrics and gynecology residents," Fertility Research and Practice, vol. 6, pp. 1-6, 2020, https://doi.org/10.1186/s40738-020-00091-2.

[18] H. Y. Kim, B. Y. Sun and S. D. Kim, "Women's late marriage and low fertility," Korean Women's Development Institute, 2010, https://doi.org/10.23000/TRKO201300015072.

[19] S. H. Go et al., "Awareness of marriage, childbirth, fertility and knowledge of high-risk pregnancy among university students," Korean Parent-Child Health Journal, vol. 20, no. 2, pp. 67-79, 2017.
[20] H. W. Shin, J. M. Lee, S. J. Kim, and M. J. Jo, "Attitudes towards parenthood and fertility awareness in female and male university students in South Korea," Child Health Nursing Research, vol. 26, no. 3, p. 329, 2020, https://doi.org/10.4094/chnr.2020.26.3.329.
[21] B. P. Jones et al., "Perceptions, outcomes, and regret following social oocyte freezing in the UK; a cross-sectional survey," Acta Obstetricia et Gynecologica Scandinavica, vol. 99, no. 3, pp. 324–332, 2020, https://doi.org/10.1111/aogs.13763.
[22] Y. H. Hong et al., "A survey on the awareness and knowledge about elective oocyte cryopreservation among unmarried women of reproductive age visiting a private fertility center," Obstetrics & Gynecology Science, vol. 62, no. 6, p. 438, 2019, https://doi.org/10.5468/ogs.2019.62.6.438.
[23] H. Y. Kim, "Sense of family and living conditions of unmarried one-person households," Korean Women's Development Institute, 2007.
[24] E. S. Jung, "Impact of views on marriage and tendency to delay marriage on childbearing intention of single company employee," Sookmyung Women's University Graduate School, Department of Home Management, Major in Home Management, 2015.
[25] D. Stoop, J. Nekkebroeck, and P. Devroey, "A survey on the intentions and attitudes towards oocyte cryopreservation for non-medical reasons among women of reproductive age," Human Reproduction, vol. 26, no. 3, pp. 655–661, 2011, https://doi.org/10.1093/humrep/deq367.
[26] S. Nasab, L. Ulin, C. Nkele, J. Shah, M. E. Abdallah, and B. M. Sibai, "Elective egg freezing: What is the vision of women around the globe?," Future Science Open Access, vol. 6, no. 5, p. Fso468, 2020, https://doi.org/10.2144/fsoa-2019-0068.
[27] C. Lallemant, D. Vassard, A. Nyboe Andersen, L. Schmidt, and N. Macklon, "Medical and social oocyte freezing: Internet-based survey of knowledge and attitudes among women in Denmark and the UK," Acta Obstetricia et Gynecologica Scandinavica, vol. 95, no. 12, pp. 1402–1410, 2016, https://doi.org/10.1111/aogs.13024.
[28] S. Q. Tan, A. W. K. Tan, M. S. K. Lau, H. H. Tan, and S. Nadarajah, "Social oocyte freezing: A survey among Singaporean female medical students," Journal of Obstetrics and Gynaecology Research, vol. 40, no. 5, pp. 1345–1352, 2014, https://doi.org/10.1111/jog.12347.
[29] C. D. Wickens and C. M. Carswell, *Information processing*, Handbook of Human Factors and Ergonomics. pp. 114–158, 2021.
[30] G. S. Yoo, "Effects of consumption wants and expected wedding expenses on expected marriage age among undergraduate students," Health and Social Welfare Review, vol. 34, no. 2, pp. 367-392, 2014, https://doi.org/10.15709/hswr.2014.34.2.367.
[31] S. J. Kim, "The study on the motivation to become a parent and the view on childrearing of women college students," Korean Journal of General Education, vol. 11, no. 6, pp. 529-564, 2017.
[32] S. Y. Ahn, H. J. Kim, H. J. Park, and T. R, Kim, "Transition from youth to adulthood II: Comprehensive report," National Youth Policy Institute, 2011.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 6: 3421-3429, 2024
DOI: 10.55214/25768484.v8i6.2721