

# Is employer coverage of elective egg freezing coercive?: a survey of medical students' knowledge, intentions, and attitudes towards elective egg freezing and employer coverage

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## Abstract

**Purpose** The purpose of this study was to understand medical students' knowledge, intentions, and attitudes towards oocyte cryopreservation and employer coverage of such treatment.

**Methods** This cross-sectional study was performed via an online cross-sectional survey distributed to 280 female medical students from March through August 2016. Demographics, attitudes towards employer coverage, and factors influencing decision-making were assessed via a self-reported multiple-choice questionnaire. The relationship between respondents' attitudes towards employer coverage and other parameters was analyzed.

**Results** A total of 99 responses were obtained out of 280 female medical students. Most respondents (71%) would consider oocyte cryopreservation (potential freezers), although 8% would not consider the procedure and 21% were unsure. Seventy-six percent of respondents felt pressure to delay childbearing. Potential freezers were more likely to be single ( $p = 0.001$ ), to report feeling pressure to delay childbearing ( $p = 0.016$ ), and to consider egg freezing if offered by an employer ( $p < 0.001$ ). Importantly, 71% percent did not view employer coverage as coercive and 77% of respondents would not delay childbearing due to employer coverage. Factors influencing decision-making in potential freezers were absence of a suitable partner (83%), likelihood of success (95%), and health of offspring (94%), among others. Knowledge about the low chance of pregnancy per oocyte

(6–10%) would influence decision-making in 42% of potential freezers.

**Conclusion** Oocyte freezing is an acceptable strategy for the majority of young women surveyed. Pressure to delay childbearing was related to openness to freeze eggs. The majority of respondents did not find employer coverage for egg freezing coercive although further research is needed with larger, representative samples to ascertain the relationship between pressure to delay childbearing due to work demands and employer coverage for egg freezing.

**Keywords** Fertility preservation · Employer coverage · Elective oocyte cryopreservation

## Introduction

In October 2012, the American Society for Reproductive Medicine (ASRM) released a statement that with pregnancy rates similar to those observed with in vitro fertilization, mature oocyte cryopreservation should no longer be considered experimental [1–5]. In addition to medical indications, ASRM included deferring childbearing as a possible reason for oocyte cryopreservation, although it does not overtly recommend this. Additionally, the European Society of Human Reproduction and Embryology recommends that oocyte cryopreservation should be available “for those who want to protect their reproductive potential against the threat of time” [6]. Subsequently, there has been an increase in fertility preservation for the purposes of deferring childbearing, especially among women in time-intensive professions [7].

The increase in the mean maternal age at first birth in the USA has risen to a record high in 2014 which has led to an increased relevance for oocyte cryopreservation [8]. The increased availability and utilization of oocyte cryopreservation

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for the purposes of delaying childbearing has led to some companies such as Facebook, Apple, Intel, Citibank, and JP Morgan Chase (in the technology and banking industries) to start offering financial coverage of oocyte cryopreservation for their employees [9–11]. In a similar fashion, the US Department of Veterans Affairs now offers financial coverage for both sperm and oocyte cryopreservation for active duty service officers and those anticipating deployment [12, 13]. However, there continues to be controversy surrounding employer coverage of the use of oocyte cryopreservation for delayed childbearing [14]. These concerns include misconceptions among users about the efficacy of such treatments and the potential for coercion of female employees to delay childbearing [10, 15–17].

While there is a plethora of expert opinion articles debating the benefits and drawbacks of employee coverage, there is limited data on reproductive-aged women's thoughts and attitudes towards employer coverage of egg freezing and the effects that such coverage would have on their reproductive decision-making [9, 10, 15–17]. Women made up almost half of all medical students in 2017 [18]. As a time-intensive profession, requiring long hours and 8 or more years of postgraduate training, female medical students are an appropriate target population to assess in terms of their attitudes towards egg freezing. We chose medical students, because these young women are thinking about their future reproductive decisions as they prepare for a demanding professional career following medical school.

In the current study, we conducted a survey of female medical students to determine their knowledge, intentions, and attitudes towards fertility preservation in general and to obtain specific information on their views on employer coverage.

## Materials and methods

### Procedure

An online survey was distributed to all 280 female medical students at an urban university from March through August 2016 to assess their knowledge, attitudes, and intentions towards elective egg freezing. The survey was sent by email via SurveyMonkey, a professional survey company. Inclusion criteria for participation in the survey were female gender and current enrollment at the university's medical school.

Before beginning the survey, respondents were required to read and agree to an online permission form to indicate their consent to participate in the study. This form included information on the goal of the study, the expected duration of the survey, who to contact with questions, and the option to decline to participate in the study. This study was approved by the Institutional Review Board at Northwestern University, and all surveys were completed anonymously.

### The survey

Respondents completed questions regarding demographic information in the first section, which included questions on age, weight, height, race, ethnicity, annual household income, and some general health information. Respondents were also asked information on personally experiencing infertility (Yes/No) or knowing someone who had experienced infertility (Yes/No). Questions on age, height, and weight were filled in the blank, and all other demographic questions were in the multiple-choice format.

To assess knowledge of fertility, respondents were asked if they had ever heard about oocyte cryopreservation (Yes/No). Specific questions about fertility in a healthy couple, age-related decline in fertility, the likelihood of pregnancy per oocyte with egg freezing, and the likelihood of pregnancy following IVF treatment were also posed to respondents in a multiple-choice format. The reference data for answers to these questions were obtained from previously published data on the subject [1, 2, 19, 20]. Questions on the effect on IVF or fertility preservation on future fertility were asked in a Yes/No format.

The next section of the survey focused on respondents' attitudes towards oocyte cryopreservation; the principal question in this section determined respondents' willingness to freeze their oocytes. Respondents were asked "would you consider freezing your oocytes for non-medical reasons?" Respondents who answered "Yes" or "Maybe" were classified as potential freezers (PFs), those who responded "I don't know" were classified as doubtful freezers (DFs), and those who responded "No" were classified as never freezers (NFs). This classification was obtained from a previous paper by Stoop et al. [21]. Notably, questions in this section also addressed attitudes towards employer coverage of egg freezing (Yes/No), and the influence of employer coverage on the decision to delay childbearing and/or consider egg freezing (Yes/No/I don't know).

The last section consisted of questions aimed at determining what factors influence attitudes towards freezing oocytes. Respondents were given statements and answered "Yes" or "No" to whether those statements would affect willingness to freeze oocytes. These statements included "health of offspring," "financial reimbursement," and "complexity of treatments," among others.

### Data analysis

All statistical analyses were performed using SPSS for Microsoft Windows (SPSS Statistical Software V.22.0, IBM, Armonk, NY). Demographic data were reported as mean and standard deviation. Referent groups were determined based on the largest group. The designated referent groups were as follows: sex, female; race, white; sexual orientation,

heterosexual; marital status, single. Chi-square analysis and logistic regression were used to determine correlations between parameters. A two-sided  $p < 0.05$  was considered to be statistically significant.

**Results**

**Demographic data**

A total of 99 responses were obtained out of 280 female medical students, with a response rate of 35%. The average age of respondents was  $25 \pm 2.7$  years (mean  $\pm$  SD). Ninety-five percent ( $n = 94$ ) of respondents were heterosexual, 58% ( $n = 57$ ) were white, and 89% ( $n = 88$ ) were single at the time of taking the survey. Ninety-nine percent ( $n = 98$ ) of respondents did not have any children, and 89% ( $n = 87$ ) wanted to have children in the future. Only one respondent had personally experienced infertility, and 63% ( $n = 62$ ) knew someone who had experienced infertility. Details of demographic data are shown in Table 1.

**Knowledge about fertility and oocyte cryopreservation**

Most respondents (99%) had heard about oocyte cryopreservation. The age at which fertility significantly declines was correctly identified as age 35 by 72% ( $n = 70$ ) of respondents [22–24]. Forty-eight percent of women ( $n = 47$ ) accurately identified the likelihood of pregnancy following 1 year of unprotected intercourse in a fertile woman under age 35 as 80–89% [19, 20, 25]. When asked about the age at which it is most cost-effective to freeze one’s oocytes, most respondents answered 25–28 years (65%), and 29% with 30–33 years. Only 4% responded with 35–38 years [26]. Eighty-six percent of respondents knew that freezing their oocytes did not decrease future fertility and 14% were unsure. Importantly, over half (58%,  $n = 57$ ) of respondents overestimated the likelihood of pregnancy per oocyte after egg freezing. These data are shown in Table 2.

**Intentions towards oocyte cryopreservation**

Seventy-one percent ( $n = 66$ ) of respondents identified themselves as PFs, 8% ( $n = 8$ ) as NFs, and 21% ( $n = 20$ ) as unsure, DFs. Seventy-six percent of respondents ( $n = 71$ ) reported feeling pressure to delay childbearing for professional reasons (Table 3). Women who felt pressure to delay childbearing were more likely to be potential freezers ( $p = 0.016$ ) (Fig. 1).

There was no difference in the likelihood to be a potential freezer based on age, race, sexual orientation, knowing someone with infertility, or accurate knowledge of the age-related decline in fertility. Potential freezers were more likely to be

**Table 1** Demographic data

Variable	
Age (mean $\pm$ SD)	25.1 $\pm$ 2.7
BMI (mean $\pm$ SD)	22.2 $\pm$ 3.0
Sexual orientation, $n$ (%)	
Heterosexual	94 (95%)
Homosexual	3 (3%)
Bisexual	2 (2%)
Relationship status	
Single	88 (89%)
Married	11 (11%)
Race	
White	57 (58%)
Black	7 (7%)
Asian	31 (31%)
Other	4 (4%)
Ethnicity	
Hispanic	7 (7%)
Non-Hispanic	92 (93%)
Household income	
\$0–\$49,999	49 (50%)
\$50,000–\$74,999	15 (15%)
\$75,000–\$99,999	8 (8%)
\$100,000–\$149,999	8 (8%)
$\geq$ \$150,000	19 (19%)
Have kids	
Yes	1 (1%)
No	98 (99%)
Do you want to have children in the future	
Yes	87 (89%)
No	11 (11%)
Personally experienced infertility	
Yes	1 (1%)
No	98 (99%)
Know someone who has experienced infertility	
Yes	62 (63%)
No	37 (37%)

single, when compared to never freezers and doubtful freezers ( $p = 0.001$ ).

**Factors influencing decision-making**

Factors influencing decision-making identified by all participants were likelihood of success (90%), desire for a child (86%), health of offspring (93%), and does not decrease fertility (82%). Having to self-administer shots (37%) and being unsure of their desire to have children (47%) were less likely to be reported as factors influencing decision-making (Table 4).

**Table 2** Knowledge about fertility and oocyte cryopreservation

Variable	N (%)
Have you ever heard about oocyte cryopreservation?	
Yes	97 (99%)
No	1 (1%)
Chance of pregnancy after 1 year of unprotected intercourse for a woman aged 20–35 years	
Correctly estimated	47 (48%)
Underestimated	33 (34%)
Overestimated	18 (18%)
At what age does a woman's fertility begin to dramatically decrease	
25 years	2 (2%)
30 years	15 (15%)
35 years <sup>a</sup>	70 (72%)
40 years	11 (11%)
The chance of pregnancy per egg after egg freezing	
5–15% <sup>a</sup>	41 (42%)
20–30%	39 (40%)
35–45%	18 (18%)
At what age is it cost effective for a woman to freeze her eggs	
25–28 years	64 (65%)
30–33 years	29 (30%)
35–38 years <sup>a</sup>	4 (4%)
39–41 years	1 (1%)
Does freezing your eggs decrease your future fertility	
Yes	0 (0%)
No	84 (86%)
I don't know	14 (14%)

<sup>a</sup> Correct answer

Other factors identified as influencing oocyte cryopreservation among potential freezers were absence of a suitable partner (83%), likelihood of success (95%), financial reimbursement (86%), complexity of treatments (78%), desire for a child (89%), and health of offspring (94%). Potential freezers were more likely to report “financial reimbursement,” “likelihood of success,” “absence of a suitable partner,” and “does not affect my fertility” as factors influencing their

**Table 3** Intentions regarding egg freezing and delayed childbearing

Variable	N (%)
Would you consider freezing your oocytes for non-medical reasons?	
Yes	40 (43%)
Maybe	<i>Potential freezers</i> 26 (28%)
No	<i>Never freezers</i> 8 (8%)
I don't know	<i>Doubtful freezers</i> 20 (21%)
Do you feel pressure to delay childbearing?	
Yes	71 (76%)
No	23 (24%)

decision compared to doubtful freezers and never freezers (Table 5). When informed that the chance of pregnancy per oocyte was 6–10%, which was lower than estimated by 58% of respondents, 42% of potential freezers would change their decision to freeze.

### Attitudes towards employer coverage of oocyte cryopreservation

When asked “If you were otherwise ready to begin childbearing, would you delay because it was covered by your employer?” 77% ( $n = 72$ ) answered no. When asked the same question in a slightly different manner, specifically “If your future employer gave all women at your institution the option to freeze their eggs, would this make you decide to delay childbearing?”, 72% ( $n = 68$ ) answered no (Table 4). Seventy-three percent of respondents ( $n = 69$ ) would consider oocyte cryopreservation if it was covered by their employer, and PFs were more likely to answer yes to this question than NFs and DFs ( $p < 0.001$ ). Notably, the vast majority of women (71%,  $n = 67$ ) did not view employer coverage of oocyte cryopreservation as coercive (Fig. 1).

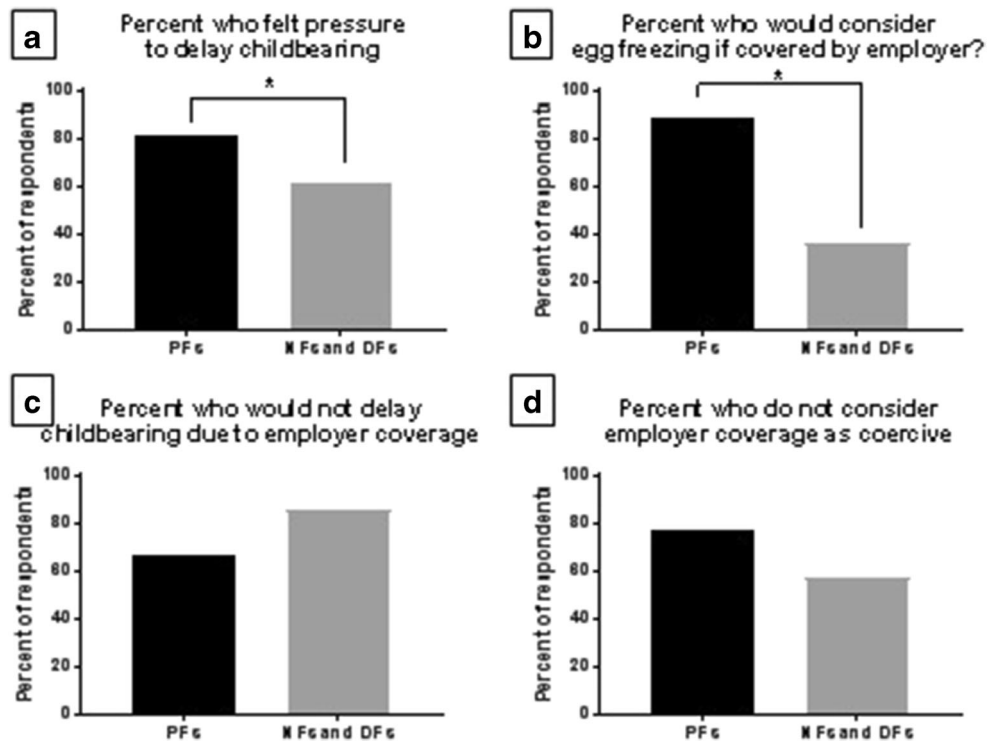
There was no difference in respondents' views on employer coverage based on their personal likelihood to freeze their eggs (i.e., potential freezers vs. doubtful or never freezers). There was also no difference in respondents' view on employer coverage based on age, race, sexual orientation, marital status, knowing someone with infertility, or accurate knowledge of the age-related decline in fertility.

### Discussion

Oocyte cryopreservation for elective indications such as delayed childbearing due to the absence of a suitable partner or career planning is a controversial topic despite widespread acceptance of oocyte cryopreservation for medical indications. This is even more relevant as companies in the technology and business sectors and, more recently, the US Department of Veterans Affairs have offered coverage for elective oocyte cryopreservation. With the plethora of opposing expert opinions on this subject, the present study assessed the attitudes towards elective egg freezing among women training in medicine, a profession that frequently necessitates delaying childbearing due to the constraints imposed by residency and fellowship [27].

As expected, the majority of women in our sample of medical students were aware of oocyte cryopreservation. They were also well informed about the age-related decline in fertility and the fact that fertility treatments did not lead to a decline in fertility. However, even in this medically knowledgeable population, only half of respondents accurately estimated the natural pregnancy rate after 1 year of trying and

**Fig. 1** **a** PFs were significantly more likely to report feeling pressure to delay childbearing when compared to DFs and NFs. **b** PFs were significantly more likely to report that they would consider freezing their eggs if it was covered by their employer. **c** When asked “If your future employer offered all women at your institution the option to freeze eggs would this make you decide to delay childbearing?”, 67% of PFs and 86% of NFs and DFs answered no. There was no significant difference in response between groups. **d** When asked if they would consider employer coverage of egg freezing to be coercive, 77% of PFs and 57% of NFs and DFs responded no. There was no significant difference between groups. *PF* potential freezers, *NF* never freezers, *DF* doubtful freezers, \**p* < 0.05



over half of respondents over-estimated the likelihood of pregnancy per oocyte from oocyte cryopreservation. This indicates that even in a very health-literate sample, there is significant room for patient education on fertility.

Seventy-one percent of respondents identify as PFs, which is similar to results seen in a survey of Singaporean medical students [28]. Interestingly, while 95% of respondents stated that the likelihood of success would alter their decision regarding oocyte cryopreservation, almost half of PFs would change their decision when informed that the likelihood of pregnancy per oocyte was as low as 6–10%. While not a direct

comparison due to different survey styles, the effect of this knowledge on decision-making is less than that reported by Singaporean medical students [28]. This is likely secondary to the fact that 99% of our population had previously heard about oocyte cryopreservation, compared to 36.4% in the Singaporean study. Baseline knowledge of oocyte cryopreservation was higher in our population, and subsequently, education on success rates led to smaller change in decision-making. It is also worth noting that a recent study published after the distribution of our survey suggests a greater variance in the likelihood of pregnancy per oocyte, as high as 26% for women

**Table 4** Factors influencing egg freezing decisions based on intentions towards egg freezing

Variable	Total sample <sup>a</sup>	Potential freezers <sup>a</sup>	Doubtful freezers and never freezers <sup>a</sup>	<i>p</i> value
Does not affect my future fertility	82%	86%	67%	0.053
<b>Financial reimbursement</b>	<b>77%</b>	<b>86%</b>	<b>56%</b>	<b>0.002</b>
<b>Likelihood of success</b>	<b>90%</b>	<b>95%</b>	<b>78%</b>	<b>0.010</b>
Complexity of treatments	74%	78%	63%	0.134
<b>Absence of a suitable partner</b>	<b>73%</b>	<b>83%</b>	<b>48%</b>	<b>0.001</b>
Desire for a child	86%	89%	75%	0.096
Health of offspring	93%	94%	89%	0.427
Ease of access to a fertility specialist	73%	78%	59%	0.066
<b>Unsure of desire to have children</b>	<b>47%</b>	<b>55%</b>	<b>30%</b>	<b>0.029</b>
Giving myself daily injections	37%	38%	37%	0.967

Bold highlights to statistically significant difference between groups

<sup>a</sup> Respondents were asked if the above variable would alter their decision towards egg freezing. The percent of respondents who answered Yes is reported

**Table 5** Attitudes on employer coverage of egg freezing

Variable	N (%)
If you were otherwise ready to begin childbearing, would you delay because it was covered by your employer?	
Yes	12 (13%)
No	72 (77%)
I don't know	10 (10%)
Would you consider freezing your eggs if it was covered by your employer?	
Yes	69 (73%)
No	13 (14%)
I don't know	12 (13%)
If your future employer gave all women at your institution the option to freeze their eggs, would this make you decide to delay childbearing?	
Yes	14 (15%)
No	68 (72%)
I don't know	12 (13%)
If your current employer gave all women at your company/institution the option to freeze their eggs, would you perceive this as coercion to delay childbearing?	
Yes	27 (29%)
No	67 (71%)

younger than 35 years of age [29]. Whether or not this higher rate of pregnancy alters PFs' decision-making would be worth examining in future studies.

Our data also show that single women and women who felt pressure to delay childbearing because of their career were more likely to identify as PFs. The lack of change in some PFs' decision-making in light of data showing lower success rates than previously expected may indicate that women believe these lower rates to be acceptable or feel that have no reasonable alternative in the face of other factors such as the lack of a suitable partner and/or career plans. This underscores the complex situational and psychological factors at play when making decisions regarding childbearing. Given this, we believe consideration should be given to psychological consultation for women contemplating egg freezing to ensure that such patients have realistic expectations.

In this paper, we also addressed the question of employer coverage. We found that most respondents (71%) identified as potential freezers, and most (67%) were not opposed to employer coverage irrespective of their personal likelihood to freeze their oocytes. Even more importantly, most women stated they would not delay childbearing because of employer coverage of oocyte cryopreservation. Although coverage for elective egg freezing but not elective sperm cryopreservation appears on the surface to raise concerns about the motives of employers, results of the present study cast doubt on some of the potentially paternalistic commentary on employer-covered oocyte cryopreservation as coercive. While we acknowledge

that the pressure of corporate culture is real, as evidenced by the fact that 76% of women reported feeling pressure to delay childbearing, the same group of women do not view employer coverage as coercive and would proceed with childbearing if they already planned to do so. It is, however, important to note that women who reported feeling pressure to delay childbearing were more likely to identify as potential freezers, which further illustrates the complexity of this decision-making process and may indicate the presence of subtle emotional coercion of which participants were not aware. This finding may also indicate that because of their perceived pressure to delay childbearing, these respondents were already thinking of their fertility future and thus were considering fertility preservation prior to taking this survey.

Limitations of this study include the small study size, single university, and a study population limited only to medical students. We recognize that medical students represent a knowledgeable group of women than the general population. While this raises concerns about generalizability, we believe that because medicine is one of the most demanding careers for women, it is an important starting point to understand how medically savvy women about to embark on a demanding career approach navigating their reproductive life [27]. This is a pilot study, and in future studies, we will collect data from a more diverse group of women across differing professional settings. Furthermore, since medical employers do not currently offer coverage for elective oocyte cryopreservation, there is lower likelihood for introduction of bias from this area. Other strengths of this study include that the study population is of reproductive-aged women for whom the question is most pertinent. This study also addresses a novel and timely question that the medical community must be involved in answering.

In conclusion, most women in this well-informed population would consider elective egg freezing for themselves and do not view employer coverage as coercive. Although feeling pressure to delay childbearing was associated with identifying as a potential egg freezer, three out four women who were otherwise ready to begin having children would not delay due to employer coverage. Potential freezers were more likely to mention financial reimbursement as a factor affecting decision-making and to consider egg freezing if it was covered by their employer. Thus, employer coverage of egg freezing may enable women who already want to freeze their oocytes by helping them achieve their reproductive goals. Although this study did not find an effect of employer-based coercion among participants, the risk of coercion cannot be eliminated and thus continued efforts to prevent or reduce coercion are warranted. These data also emphasize the role of physicians in patient education and the potential pitfalls of not understanding and soliciting the opinions of the population most affected by a medical intervention before conclusions about its reception and effects are reached.

**Compliance with ethical standards** This study was approved by the Institutional Review Board at Northwestern University, and all surveys were completed anonymously.

**Authors' roles** All authors were involved in study data analysis, and interpretation, drafting, and revising the manuscript critically for important intellectual content, final approval of the manuscript to be published, and agreement to be accountable for all aspects of the work.

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