

Family Planning, Fertility, and Medical School: A Survey of Students' Plans and Perceptions of Institutional Support

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Acknowledgments

The authors wish to thank all survey participants for their time and insight on this important topic.

Disclosures

Conflicts of Interest: None declared
Funding: None declared

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Published Online First: June 20, 2023

Final issue publication: September 15, 2023

Volume 27 Issue 3

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Perm J 2023;27:23.003 • <https://doi.org/10.7812/TPP/23.003>

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Abstract

BACKGROUND: Deciding when to pursue parenthood can be difficult for medical trainees and infertility is more common in the physician population. However, few studies have examined the views of very early career trainees. The goal of this study was to assess premedical and medical student plans for family building, knowledge of fertility, and thoughts on assisted reproductive technology, as well as institutional support for parenthood in medical school and fertility curriculum.

METHODS: Web-based cross-sectional survey on Qualtrics distributed through social media and school organization-based networks. Responses were reported as frequency and percent and compared across subgroups of population with χ^2 tests.

RESULTS: The study had a total of 605 premedical and medical students respondents. Most students (78%) do not have children but plan to have children in the future. Almost two-thirds (63%) of students would consider using assisted reproductive technology. More than 80% of respondents have considered or would consider oocyte cryopreservation for themselves or their partners. A majority (95%) of students are worried about balancing parenthood and a career in medicine and about their fertility declining while they complete medical training (84%). The most frequently cited barriers to family planning during medical school and residency were: limited time off during training (84%), demands of training (82%), cost of having a child (59%), and stigma of having a child during training (45%). Less than half of medical students had formal education on infertility.

CONCLUSIONS: Premedical and medical students are worried about fertility declining in training and about balancing parenthood and medical careers, but gaps in knowledge and institutional support exist.

Introduction

Medical trainees face challenges with family building and fertility, including issues

related to parental leave, child-care, and lactation support.¹ There is a growing emphasis on addressing these barriers in graduate medical education.¹⁻⁷ However, less attention has

been paid to premedical and medical students, who may have similar experiences as later-career physicians.

Many physicians choose to delay childbearing and frequently cite their career or education as the primary reason.⁸⁻¹¹ Trainees who do delay may encounter issues of declining fertility with increasing age.¹²⁻¹⁷ The rate of infertility in physicians is estimated to be twice that of the general population, and one-third of infertility cases in this population have been attributed to age or diminished ovarian reserve.⁹ Initiating childbearing at a later age may also increase the likelihood of adverse reproductive outcomes.^{12,18} LGBTQ+ physicians also face a disproportionate burden of family planning challenges—including increased costs of assisted reproductive technology (ART), adoption, and surrogacy. Medical institutions are also less likely to have supportive policies for these options.¹⁹

Despite the prevalence of infertility, there are gaps in knowledge on age-related fertility decline and the success of ART in both the general and physician populations.²⁰⁻²⁷ Studies of university students,²⁸ students in graduate school programs,^{29,30} and medical students,^{27,31,32} who may delay childbearing for career or educational pursuits, have also shown similar results.

It is valuable to better understand the family planning intentions and baseline fertility knowledge of the student population. This knowledge may be used to develop earlier educational programming and policies to support future trainees. This paper sought to investigate the family building intentions of premedical and medical students, barriers to building a family during medical training, and knowledge and perceptions of fertility and ART in premedical and medical students.

Methods

Current premedical and medical students (N = 605) who intend to practice in the United States after medical school were recruited to participate in an anonymous, voluntary, 10-minute questionnaire through Qualtrics, a commonly utilized, secure survey platform. Study information was disseminated widely, including sharing to all American Medical Women's Association social media platforms and branch listservs, the American Medical Association Students Facebook group, and various medical institution student groups. The study was approved by the

institutional review board at the University of Southern California.

No compensation was provided for study participation. Data were collected over a 5-week period from October to December 2021, with recruitment blasts sent on the first day, midpoint, and 1 week before survey closure.

SURVEY

The 30-question survey was developed based on extensive literature review of similar survey questions. Most questions are taken from the FIT-KS survey, which has been used in the medical student population.²⁷ Other surveys were reviewed and concepts were incorporated as appropriate.^{16,23,33-35} Question choice was guided by the clinical experience of investigators and existing studies.

Survey respondents were asked to describe their plans for parenthood. Those who responded that they intended to have children were asked further questions regarding number, timing, perceived barriers, and support. A section of this survey focused on ART. Respondents were first asked questions relating to their experience with infertility and ART, as well as their thoughts on future family planning as it relates to these topics. A series of knowledge questions followed, aiming to ascertain respondent understanding of basic reproductive physiology and ART.

At the end of the survey, respondents were given the opportunity to write a free-text response about their plans to build a family throughout medical training. These answers provided further insight and context to the quantitative data collected.

STATISTICAL ANALYSIS

Descriptive statistics were used to describe population characteristic and survey responses. Continuous variables were reported as mean (standard deviation) and compared with one-way ANOVA test across subgroups for population (premedical students, medical students, others). Categorical variables were reported as frequency (percent) and compared across subgroups with χ^2 test. The analysis was conducted using STATA version 16 (StataCorp) and a p value of 0.05 was considered significant.

Results

DEMOGRAPHICS

Demographics are reported in Table 1. The average age of all respondents was 25.2 ± 3.7 years. Most

Characteristic	Overall n(%) ^a	Premedical students; n(%) ^a	Medical students; n(%) ^a	Other; n(%) ^{a,b}	p value ^e
Age, y (± SD)	25.3 ± 3.6	23.9 ± 4.8	25.9 ± 2.8	26.3 ± 3.4	< 0.001
Gender identity					0.02
Woman	511 (88.9)	154 (91.7)	334 (88.1)	23 (82.1)	
Man	53 (9.2)	11 (6.6)	40 (10.6)	2 (7.1)	
Nonbinary	6 (1.0)	2 (1.2)	3 (0.8)	1 (3.6)	
Transgender woman	2 (0.4)	0	1 (0.3)	1 (3.6)	
Transgender man	3 (0.5)	1 (0.6)	1 (0.3)	1 (3.6)	
Prefer not to answer	0 (0)	0 (0)	0 (0)	0 (0)	
Prefer to describe	0 (0)	0 (0)	0 (0)	0 (0)	
Sex assigned at birth					0.30
Male	55 (9.6)	11 (6.6)	41 (10.8)	3 (10.7)	
Female	521 (90.4)	156 (93.4)	340 (89.2)	25 (89.3)	
Intersex	0 (0)	0 (0)	0 (0)	0 (0)	
Prefer not to answer	0 (0)	0 (0)	0 (0)	0 (0)	
Prefer to describe	0 (0)	0 (0)	0 (0)	0 (0)	
Sexual orientation					0.40
Heterosexual	450 (77.7)	124 (73.4)	308 (80.6)	18 (64.29)	
Gay	9 (1.6)	3 (1.8)	5 (1.3)	1 (3.6)	
Bisexual	63 (10.9)	23 (13.6)	37 (9.7)	3 (10.7)	
Demisexual	4 (0.7)	1 (0.6)	2 (0.5)	1 (3.6)	
Fluid	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Asexual	2 (0.3)	0 (0.0)	2 (0.5)	0 (0.0)	
Lesbian	16 (2.8)	5 (3.0)	9 (2.4)	2 (7.1)	
Pansexual	9 (1.5)	5 (3.0)	3 (0.8)	1 (3.5)	
Queer	17 (2.9)	5 (3.0)	10 (2.6)	2 (7.1)	
Questioning	7 (1.2)	3 (1.8)	4 (1.0)	0 (0.0)	
Prefer not to answer	2 (0.3)	0 (0.0)	2 (0.5)	0 (0.0)	
Prefer to describe	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Race^d					< 0.001
White	391 (67.5)	100 (59.2)	275 (72.0)	16 (57.1)	
Hispanic, Latinx, or Spanish origin	78 (13.5)	(11.8)	(6.5)	(14.3)	
Black or African American	38 (6.6)	14 (8.3)	19 (5.0)	5 (17.9)	
Multi-Race	27 (4.7)	8 (4.1)	17 (4.4)	3 (10.7)	
American Indian or Alaskan Native	6 (1.0)	2 (1.2)	4 (1.1)	0 (0)	
Asian	104 (18.0)	31 (18.3)	66 (17.3)	7 (25.0)	
Middle Eastern	20 (3.5)	7 (4.1)	12 (3.1)	1 (3.6)	
Native Hawaiian or Pacific Islander	0 (0)	0 (0)	0 (0)	0 (0)	
Prefer to describe	5 (0.9)	0 (0)	5 (1.3)	0 (0)	
Prefer not to answer	0 (0)	0 (0)	0 (0)	0 (0)	
Relationship status					0.02
Partnered total	414 (71.5)	101 (59.8)	291 (76.2)	22 (78.6)	
Married	102 (17.6)	26 (15.4)	69 (18.1)	7 (25.0)	
Domestic partner	17 (2.9)	6 (3.6)	10 (2.6)	1 (3.6)	
In a relationship	295 (51.0)	69 (40.8)	212 (55.5)	14 (50.0)	
Not partnered total	164 (28.4)	68 (40.2)	90 (23.6)	6 (21.4)	
Single	163 (28.2)	68 (40.2)	89 (23.3)	6 (21.4)	
Widowed	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	

Table 1: Demographics of study population among total survey responders and comparison by current educational status (Continued)

Table 1: Continued

Characteristic	Overall n(%) ^a	Premedical students; n(%) ^a	Medical students; n(%) ^a	Other; n(%) ^{a,b}	p value ^c
Divorced	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Separated	1 (0.2)	0 (0.0)	1 (0.3)	0 (0.0)	
Future specialty					
Surgical total	135 (34.5)	-----	-----	-----	
General surgery/surgery/ undifferentiated surgical subspecialty	29 (7.4)	-----	-----	-----	
Obstetrics & gynecology	69 (17.6)	-----	-----	-----	
Otolaryngology	3 (0.8)	-----	-----	-----	
Plastic surgery	4 (1.0)	-----	-----	-----	
Orthopedic surgery	11 (2.8)	-----	-----	-----	
Urology	3 (0.8)	-----	-----	-----	
Ophthalmology	9 (2.3)	-----	-----	-----	
Neurosurgery	4 (1.0)	-----	-----	-----	
Undecided surgery	3 (0.8)	-----	-----	-----	
Non-surgical total	233 (59.6)	-----	-----	-----	
Anesthesiology	9 (2.3)	-----	-----	-----	
Neurology	5 (1.3)	-----	-----	-----	
Child neurology	1 (0.2)	-----	-----	-----	
Child psychiatry	1 (0.2)	-----	-----	-----	
Psychiatry	13 (3.3)	-----	-----	-----	
Family medicine/ community medicine	46 (11.8)	-----	-----	-----	
Dermatology	15 (3.8)	-----	-----	-----	
Emergency medicine	32 (8.2)	-----	-----	-----	
Emergency-internal medicine combined	1 (0.2)	-----	-----	-----	
Internal medicine	40 (10.2)	-----	-----	-----	
Medicine-pediatrics	7 (1.8)	-----	-----	-----	
Pathology	4 (1.0)	-----	-----	-----	
Pediatrics	39 (9.9)	-----	-----	-----	
Primary care	3 (0.8)	-----	-----	-----	
Radiology	7 (1.8)	-----	-----	-----	
Physical medicine & rehabilitation	6 (1.5)	-----	-----	-----	
Undecided non-surgery	4 (1.0)	-----	-----	-----	
Undecided	23 (5.9)	-----	-----	-----	

^a Total numbers may vary due to item non-response or missing

^b Other: currently pursuing another concurrent degree (ie, MPH, PHD, MBA etc) or currently taking time off for other reasons

^c All statistical tests were χ^2 with the exception of age which was a one-way ANOVA

^d Totals equal more than 100% because participants were allowed to select more than one answer

^e p values < 0.05 were considered significant and represent comparisons across subgroups of students

participants self-identified as female (90.4%). Among participants, 511 identified as women (88.9%), 53 as men (9.2%), 6 as nonbinary (1.0%), and 5 as transgender (0.9%). Most self-identified as heterosexual (450, 77.7%), while 63 self-identified as bisexual (10.9%), 9 as gay (1.6%), 16 as lesbian (2.8%), 17 as queer (2.9%), and 24 as other identities including pansexual, questioning, demisexual, asexual, and

prefer not to answer (4.0%). Most respondents were medical students or recent medical school graduates within the last 6 months (n = 401, 66%). Of the remaining participants, 177 were premedical students (29%) and 26 (4%) were “other” (19 currently pursuing a concurrent degree—MBA, PhD, etc, 7 taking time off for another reason, and 1 unknown). The majority of participants were partnered (71.5%), but premedical

students were less likely to be partnered than medical students (58.9% vs 76.2%) or those pursuing concurrent degrees/taking time off (75.0%).

STUDENT THOUGHTS AND FUTURE PLANS

Findings related to students' thoughts on family building, ART, and fertility preservation are shown in Table 2. Most students (77.8%) do not have children but plan to have children in the future, with most planning to have children during residency or fellowship (76.5%), or after training is complete (40.4%). Very few participants (3.3%) reported that they or their partners had experienced infertility, but almost two-thirds (63.6%) would consider using ART to have children. More than 85% of respondents have considered or would consider oocyte cryopreservation for themselves or their partners. Premedical students and medical students did not differ significantly in the number of children they want to have, and most students wanted between 1 and 3 children (88.4%).

KNOWLEDGE AND EDUCATION

Medical student educational experiences and knowledge of fertility related topics are also shown in Table 2. Fertility and fertility preservation education was lacking in medical school curriculums, with less than half receiving lectures on age-related fertility decline (33.3%), infertility (32.5%), in vitro fertilization (18.7%), or oocyte cryopreservation (9.2%). Fertility knowledge did not differ significantly between stages of education. More than 75% of students incorrectly estimated the cost of in vitro fertilization treatment and only 61% correctly identified the period in which female fertility declines most precipitously. The majority of premedical and medical students selected the correct answer for questions regarding the age of a female's eggs (78.2%) and the contribution of male (vs) female factors to infertility (72.0%).

STUDENT FEARS AND BARRIERS

Student fears and perceived barriers to family building are presented in Table 3. Most participants (83.5%) agreed or strongly agreed that they are worried about their fertility declining while they complete their medical training and about balancing parenthood and a medical career (94.3%). Ninety-seven percent agreed or strongly agreed that a career in medicine impacts childbearing decisions, with 80.9% agreeing that they would have been more likely to have children earlier in life if they were not pursuing medicine. The most common perceived barriers to family building during medical school and residency were: limited time off during training (83.8%), demands of training (82.0%), cost of having a child (59.2%), stigma of having a child during training (44.9%), not partnered or waiting for

right partner (22.5%), lack of family or social support (22.5%), other (7.4%), and none of the above (0.4%).

Similarly, there were a number of barriers students perceived to pursuing egg freezing for themselves or their partners. The most frequent barrier was cost (76.2%), followed by not knowing enough about the process (47.3%), and time (36.1%). Other barriers included not feeling it was necessary (24.2%), religious beliefs about ART (7.4%), social stigma (6.9%), and cultural beliefs about ART (4.7%). There were many factors that would increase the likelihood of pursuing egg freezing, including insurance coverage (80.5%), supportive policies from their school/program (59.8%), increased education on egg freezing (50.3%), whether they decided to pursue longer training (47.3%), whether their doctor talked with them about egg freezing (44.0%), or whether they knew someone else who had gone through the egg freezing process (39.9%).

Out of 522 who answered whether they felt their school would provide good support if they or their partner were to become pregnant, 214 disagreed or strongly disagreed (41.0%), 119 were neutral (22.8%), and only 116 agreed or strongly agreed (22.2%).

FREE RESPONSE

Table 4 shows a selection of free response answers from participants. A total of 203 participants answered the free response question. Many responses fit into the categories of age/timing, support, cost, stigma, and reproductive decision making.

Discussion

The results of this study overwhelmingly demonstrate that premedical and medical students are concerned about family building and fertility at the early stages of their medical training. Much of the current literature has focused on later-stage trainees and physicians, but this study demonstrates a need for institutional support and education at earlier stages. These data underscore the importance of comprehensive fertility and reproductive life planning support and education in medical training.

A majority of students would not feel supported by their institution if they became parents during school. And while most respondents intend to have children during residency or fellowship, a small but substantial minority have children already or plan to have children during medical school. These data are consistent with statistics released from

Characteristic	Total n(%) ^a	Premedical students; n(%) ^a	Medical students; n(%) ^a	Other; n(%) ^{a, b}	p value ^f
Which of the following best describes your plan for parenthood?					0.001
Already have children and plan to have more	24 (4.2)	3 (1.8)	16 (4.2)	5 (17.9)	
Already have children and do not plan to have more	9 (1.6)	6 (3.6)	3 (0.8)	0 (0.0)	
Do not have children and plan to have children	450 (77.8)	123 (73.2)	309 (81.1)	18 (64.3)	
Do not have children and do not plan to have children	46 (8.0)	19 (11.3)	24 (6.3)	3 (10.7)	
I do not know	48 (8.3)	17 (10.1)	29 (7.6)	2 (7.1)	
At what point in your training do you plan to have children?^c					
During medical school	91 (15.7)	39 (23.1)	45 (11.8)	7 (25.0)	0.001
During residency	263 (45.4)	68 (40.2)	184 (48.2)	11 (39.3)	0.18
During fellowship	180 (31.1)	58 (34.3)	116 (30.4)	6 (21.4)	0.34
After training is complete	234 (40.4)	63 (37.3)	164 (42.9)	164 (42.9)	0.11
I do not know	234 (40.4)	63 (37.3)	164 (42.9)	164 (42.9)	0.11
How many children would you like to have?					0.57
1	25 (4.8)	6 (4.2)	17 (4.8)	2 (8.0)	
2	260 (50.0)	76 (53.2)	171 (48.6)	13 (52.0)	
3	175 (33.7)	45 (31.5)	121 (34.4)	9 (36.0)	
4	45 (8.7)	8 (5.6)	36 (10.2)	1 (4.0)	
5+	15 (2.9)	8 (5.6)	7 (2.0)	0 (0.0)	
Have you or your partner ever experienced infertility?^d					0.001
Yes	19 (3.3)	7 (4.2)	8 (2.1)	4 (14.8)	
No	551 (96.7)	160 (95.8)	368 (97.9)	23 (85.2)	
Would you consider using ART to have children?					0.43
Yes	367 (63.6)	102 (60.4)	247 (65.0)	18 (64.3)	
No	71 (12.3)	26 (15.4)	40 (10.5)	5 (17.9)	
Not sure	139 (24.1)	41 (24.3)	93 (24.5)	5 (17.9)	
Have you ever considered oocyte cryopreservation (egg freezing) for yourself or your partner?					0.13
I have frozen eggs in the past	3 (0.5)	0 (0.0)	2 (0.5)	1 (3.6)	
I have considered egg freezing but have not pursued it	184 (31.9)	43 (25.4)	132 (34.8)	9 (32.1)	
I have considered egg freezing and tried to pursue it but experienced barriers	16 (2.8)	6 (3.6)	9 (2.4)	1 (3.6)	
I have not considered egg freezing, but I would consider it in the future	298 (51.7)	94 (55.6)	192 (50.7)	12 (42.9)	
I would never consider egg freezing	76 (13.0)	26 (15.4)	44 (11.6)	5 (17.9)	
During medical school have you had lectures on:					
Infertility	188 (32.5)	-----	-----	-----	
Age-related fertility decline	193 (33.3)	-----	-----	-----	
Egg freezing	53 (9.2)	-----	-----	-----	
In vitro fertilization	108 (18.7)	-----	-----	-----	

Table 2: Future fertility plans and knowledge among total survey responders and comparison by current educational status (Continued)

Table 2: *Continued*

Characteristic	Total n(%) ^a	Premedical students; n(%) ^a	Medical students; n(%) ^a	Other; n(%) ^{a, b}	p value ^f
Over which age range does a female's ability to get pregnant decline most precipitously?^e (Answer: 35-39)					0.15
Answered correctly	353 (61.2)	96 (56.8)	236 (62.1)	21 (75.0)	
Answered incorrectly	224 (38.8)	73 (43.2)	144 (37.9)	7 (25.0)	
What is the average cost of an IVF cycle in the USA?^e (Answer: \$12,000)					0.24
Answered correctly	122 (21.1)	30 (17.8)	88 (23.2)	4 (14.3)	
Answered incorrectly	455 (78.9)	139 (82.3)	292 (76.8)	24 (85.7)	
A female's eggs are as old as they are.^e					0.15
True (correct)	451 (78.2)	130 (76.9)	295 (77.6)	26 (92.9)	
False (incorrect)	126 (21.8)	39 (23.1)	85 (22.4)	2 (7.1)	
Male factors contribute to infertility much less often than female factors.^e					0.71
True (incorrect)	159 (27.7)	44 (26.0)	109 (28.8)	6 (21.4)	
False (correct)	414 (72.0)	125 (74.4)	267 (70.6)	22 (78.6)	

^a Total numbers may vary due to item non-response or missing.

^b Other: currently pursuing another concurrent degree (ie, MPH, PhD, MBA etc) or currently taking time off for other reasons.

^c Participants were allowed to select more than 1 option.

^d Defined generally as failure to achieve pregnancy within 12 mo of unprotected intercourse.

^e Knowledge question from FIT-KS scale.

^f p values < 0.05 were considered significant and represent comparisons across subgroups of students.

ART = assisted reproductive technology; IVF = in vitro fertilization.

the Association of American Medical Colleges that about 7% of graduating medical students are parents.³⁶ Students in this survey identified cost, limited time off, demands of training, and stigma as barriers to having children during medical school and residency. These results echo previous studies of resident physicians¹⁻⁷ and demonstrate a need for better protection for students who have or intend to have children during schooling. As medical schools increasingly focus on student wellness, an important consideration is the family planning intentions of students. For example, flexibility in scheduling or financial support for pregnancy or ART could be made available.

The cost of medical education has increased by about 750% from the 1960s to 2018 and many students incur a substantial debt burden during medical school.³⁷⁻³⁹ This, combined with the costs associated with child-rearing,⁴⁰ can be difficult for students and early career trainees. Assigned female at birth and LGBTQ+ physicians are also more likely to incur substantial costs of family building through ART, adoption, and surrogacy. A recent study of surgeons found that the costs of ART, adoption, and surrogacy are often greater than \$40,000.¹⁹ Both self-identified female and LGBTQ+ students in this survey identified unique barriers and concerns in free response

form. There are also large disparities in access to infertility services in the general population.⁴¹⁻⁴³ Although there has not been a comprehensive study of student access to or student health insurance coverage of ART, students likely face similar access issues as the general population.

In addition to cost concerns, most medical schools lack parental leave policies for their students.^{44,45} Medical students in their clinical years, in particular, work similar hours to resident physicians, and are also likely to face similar issues with childcare and lactation support.¹ Medical students have successfully championed protections for parenting students,⁴⁶ but broader guidance on best practices for parental leave policy from national organizations like the Association of American Medical Colleges would be beneficial.^{4,47} Previous studies of parenting medical students have emphasized the need for flexibility and supportive administration.⁴⁸ Other solutions proposed for residents, including expanding access to lactation rooms¹ and on-site childcare,⁴⁹ should also be made available to medical students rotating at those training sites. In addition to supportive policies at the school and national organizational levels, students need education about the resources and rights available to them. For example, many students are interested in hearing about parental leave policies during residency interviews, but this information is not frequently presented.⁵⁰

Characteristic					n(%) ^a
What barriers do you perceive to having children during medical school or residency training?^b					
Cost of having a child					343 (59.2)
Limited time off during training					485 (83.8)
Demands of training					475 (82.0)
Stigma of having a child during training					260 (44.9)
Lack of family or social support					130 (22.5)
Not partnered or waiting for right partner					130 (22.5)
Other					43 (7.4)
None of the above					2 (0.4)
Which of the following are barriers to pursuing egg freezing for yourself or your partner?^b					
Don't know enough about the process					274 (47.3)
Cost					441 (76.2)
Time					209 (36.1)
Don't feel it is necessary					140 (24.2)
Social stigma					40 (6.9)
Cultural beliefs about ART					27 (4.7)
Religious beliefs about ART					43 (7.4)
Other					55 (9.5)
None of the above					18 (3.1)
Which of the following factors would increase the likelihood of pursuing egg freezing for yourself or your partner?^b					
Insurance coverage					466 (80.5)
If I decided to complete longer training					274 (47.3)
If there were policies from my medical school or residency program supporting time off for appointments and treatments					346 (59.8)
If I had more education about egg freezing					291 (50.3)
If I knew someone else who had been through the process of egg freezing					231 (39.9)
If my doctor talked with me about egg freezing					255 (44.0)
Other					12 (2.1)
None of the above					63 (10.9)
Characteristic	Total n(%) ^a	Premedical student; n(%) ^a	Medical student; n(%) ^a	Other; n(%) ^{a,c}	p value ^d
I am worried about my fertility declining while I am in training.					
Strongly agree	263 (50.4)	74 (51.4)	174 (49.3)	15 (60)	0.91
Somewhat agree	173 (33.1)	45 (31.3)	120 (34.0)	8 (32.0)	
Neutral	24 (4.6)	9 (6.3)	14 (4.0)	1 (4.0)	
Somewhat disagree	24 (4.6)	6 (4.2)	18 (5.1)	0 (0.0)	
Strongly disagree	27 (5.2)	8 (5.6)	18 (5.1)	1 (4.0)	
Not applicable	11 (2.1)	2 (1.4)	9 (2.6)	0 (0.0)	
If my partner or I were to become pregnant during my time in medical school, we would have good support from my school (for flexible time off, resources, etc).					
Strongly agree	20 (3.8)	2 (1.4)	18 (5.1)	0 (0)	< 0.001
Somewhat agree	96 (18.4)	16 (11.1)	76 (21.5)	4 (16.0)	
Neutral	119 (22.8)	21 (14.6)	95 (26.9)	3 (12.0)	
Somewhat disagree	130 (24.9)	32 (22.2)	91 (25.8)	7 (28.0)	
Strongly disagree	84 (16.1)	14 (9.7)	62 (17.6)	8 (32.0)	

Table 3: Barriers and fears associated with family building (Continued)

Table 3: Continued

Characteristic	Total n(%) ^a	Premedical student; n(%) ^a	Medical student; n(%) ^a	Other; n(%) ^{a,c}	p value ^d
Not applicable	73 (14.0)	59 (41.0)	11 (3.1)	3 (12.0)	
I feel that a career in medicine impacts childbearing decisions					0.17
Strongly agree	391 (74.9)	95 (66.0)	274 (77.6)	22 (88.0)	
Somewhat agree	115 (22.0)	42 (29.2)	70 (19.8)	3 (12.0)	
Neutral	4 (0.77)	1 (0.7)	3 (0.9)	0 (0)	
Somewhat disagree	7 (1.3)	4 (2.8)	3 (0.9)	0 (0)	
Strongly disagree	4 (0.8)	1 (0.7)	3 (0.9)	0 (0)	
Not applicable	1 (0.2)	1 (0.7)	0 (0)	0 (0)	
If I chose a career other than medicine, I would have been more likely to have children earlier in life.					0.12
Strongly agree	220 (42.2)	60 (41.7)	145 (41.1)	15 (60.0)	
Somewhat agree	202 (38.7)	46 (31.9)	149 (42.2)	7 (28.0)	
Neutral	45 (8.6)	15 (10.4)	29 (7.9)	2 (8.0)	
Somewhat disagree	31 (5.9)	11 (7.6)	19 (5.4)	1 (4.0)	
Strongly disagree	23 (4.4)	11 (7.6)	12 (3.4)	0 (0)	
Not applicable	1 (0.2)	1 (0.7)	0 (0)	0 (0)	
I am worried about balancing parenthood and my career in medicine in the future.					0.30
Strongly agree	366 (70.0)	105 (72.9)	242 (68.4)	19 (76.0)	
Somewhat agree	127 (24.3)	29 (20.1)	94 (26.6)	4 (16)	
Neutral	9 (1.7)	3 (2.1)	6 (1.7)	0 (0)	
Somewhat disagree	16 (3.1)	4 (2.8)	11 (3.1)	1 (4.0)	
Strongly disagree	5 (1.0)	3 (2.1)	1 (0.3)	1 (4.0)	
Not applicable	0 (0)	0 (0)	0 (0)	0 (0)	

^a Total numbers may vary due to item non-response or missing.

^b Participants were allowed to select more than 1 option.

^c Other: currently pursuing another concurrent degree (ie, MPH, PhD, MBA etc) or currently taking time off for other reasons.

^d p values < 0.05 were considered significant and represent comparisons across subgroups of students.

Efforts to improve policies and education are important because perceptions of family building support have implications for students' future careers. For example, students may be discouraged from pursuing surgical training because of concerns over balancing a demanding residency and parenthood.^{51,52} There are also concerns about stigma surrounding pregnancy or parenthood in residency training, which has been most often identified in surgical specialties.³ These sentiments were echoed in the free response portion of the survey.

In addition to institutional policies and programs to support students, there is a widespread need for education regarding fertility. A significant portion of respondents had gaps in knowledge about age-related fertility decline and male factors in infertility, which is consistent with previous research on students and residents.²⁶⁻³¹ A majority of medical students in this survey had

not received formal education on infertility, ART, or oocyte cryopreservation, which has important implications not only for their personal knowledge but also for their ability to counsel future patients. Additionally, many students were interested in pursuing ART or oocyte cryopreservation but cited a lack of knowledge about the process as a barrier. Previous research has shown that brief educational interventions can increase medical student knowledge on these topics,³² and should be implemented more broadly across medical school curriculums. Education earlier in medical and premedical curriculums can empower students to make informed career and family planning decisions.

LIMITATIONS

Limitations of this study include self-selection bias in survey participants. Those with concerns about family building and fertility may have been more likely to participate. A higher proportion of participants

Theme	Example quote
Age/Timing	“As a premedical student, I am planning to have children when my partner and I feel ready rather than trying to wait for the best time during or after training. This may be naive, but I am very worried about waiting too long and having age-related fertility issues.”
	“I know due to my age I will need to have children during medical school and residency and I am very nervous that I will face limited opportunities or backlash due to this.”
	“I would probably choose to try to have children in 2 years if I wasn’t in medicine, instead I’m planning to wait until the end of residency in 4 years and hoping I don’t encounter difficulty when we start trying.”
	“As an LGBTQ+ person, I always thought that family planning would be pushed off until later in life when I had the stability, finances, support, etc to go about building my family. Being a LGBTQ+ in medicine has only pushed that process further back and has put more barriers in front of that process.”
Support	“Family leave is not widely discussed and I do not know what policies are around to support me if I choose to become a parent. I do not know where I will be for residency and this has impacted my relationship as my recent partners have been opposed to long-distance relationships.”
	“I think that it is difficult to think about having kids when the infrastructure is stacked against you. While some institutions are looking to change, there is not a large enough movement to enact large changes nationwide.”
	“If the system was more supportive I would be looking more into having a family earlier, but at this stage feel pressure to not conceive which makes me worry for my future. I worry that by the time I am out of my medical training I will have a short span to create a family which makes me stressed I won’t conceive.”
	“I’m currently pregnant with my second child in my second year of medical school and have been faced with a lot of difficulty working with my school for accommodating me and presenting options.”
Cost	“I think if residency programs were required to cover egg freezing in our insurance plans, that would alleviate a lot of my stress. I’m sure that most female physicians or soon-to-be physicians would agree.”
	“I find it ironic that in a career about medicine there’s hardly any support for fertility treatments or cost support. It is incredibly disappointing and almost discriminatory to limit women that way.”
	“As a gay man, I have only 2 very expensive and time consuming options: adoption (vs) IVF & surrogacy. I’m not sure when I’ll be financially stable enough or have enough time to devote to having a child.”
	“Student loan debt payments are an extremely influential component in this decision, especially for those coming from backgrounds that required a high number of loans to afford education and training. Residents are not paid very highly and also have to repay loans, so if the partner finds it necessary to stay home and take care of a child, an income is lost which could greatly negatively impact the odds of planning to have another child.”
Stigma	“I’ve had 2 children during medical school, and it has been very challenging. The worst part was having no postpartum leave and returning 1 week postpartum each time. The second worst part was dealing with judgment from attendings, residents, and peers and lack of support for breastfeeding.”
	“I hoped to have a child third year but decided not to do so because of the stigma in residency and how I will be perceived during audition rotations fourth year if I’m pregnant. I wish it wasn’t this hard.”
Reproductive decision making	“I believe that my indecision about whether or not to have children at all is in large part impacted by my decision to pursue medicine. Had I gone into a field that was less demanding, I think I would want to have children.”
	“The more I have decided to pursue medicine the more I feel inclined to put off kids or not have them at all.”

Table 4: Free response (optional): “Do you have any other thoughts you’d like to share with us about your plans to build a family?”

IVF = in vitro fertilization.

self-identified as female and medical students. Students who identify as LGBTQ+ were also underrepresented in the sample. Furthermore, there are many

topics that this study did not explore in a comprehensive manner and should be researched further, including but not limited to: surrogacy, adoption,

miscarriage, concerns about pregnancy complications and/or neonatal outcomes, and changes or special considerations given the COVID-19 pandemic and new virtual interviewing environments.

Conclusion

Premedical and medical students have similar concerns about parenting and fertility as physicians. Most students do not feel supported in parenthood and there are many opportunities for education and policy improvement at the medical school level, including well-defined policies and flexible scheduling. Policy improvements should take into consideration all forms of family building, including ART, adoption, and surrogacy. There are major gaps in the literature on the experiences of underrepresented students in particular, and future research into the needs of these groups should be a high priority.

REFERENCES

- Magudia K, Ng TSC, Bick AG, et al. Parenting while in training: A comprehensive needs assessment of residents and fellows. *J Grad Med Educ.* 2020;12(2):162-167. DOI: <https://doi.org/10.4300/JGME-D-19-00563.1>
- Jagsi R, Tarbell NJ, Weinstein DF. Becoming a doctor, starting a family—Leaves of absence from graduate medical education. *N Engl J Med.* 2007;357(19):1889-1891. DOI: <https://doi.org/10.1056/NEJMp078163>
- Todd AR, Cawthorn TR, Temple-Oberle C. Pregnancy and parenthood remain challenging during surgical residency: A systematic review. *Acad Med.* 2020;95(10):1607-1615. DOI: <https://doi.org/10.1097/ACM.0000000000003351>
- Weinstein DF, Mangurian C, Jagsi R. Parenting during graduate medical training—Practical policy solutions to promote change. *N Engl J Med.* 2019;381(11):995-997. DOI: <https://doi.org/doi:10.1056/nejmp1904721>
- Rangel EL, Smink DS, Castillo-Angeles M, et al. Pregnancy and motherhood during surgical training. *JAMA Surg.* 2018;153(7):644-652. DOI: <https://doi.org/10.1001/jamasurg.2018.0153>
- Stack SW, Eurich KE, Kaplan EA, Ball AL, Mookherjee S, Best JA. Parenthood during graduate medical education. *Acad Med.* 2019;94(11):1814-1824. DOI: <https://doi.org/10.1097/ACM.0000000000002948>
- Stack SW, Jagsi R, Biermann JS, et al. Maternity leave in residency: A multicenter study of determinants and wellness outcomes. *Acad Med.* 2019;94(11):1738-1745. DOI: <https://doi.org/10.1097/ACM.0000000000002780>
- Cusimano MC, Baxter NN, Sutradhar R, et al. Delay of pregnancy among physicians vs nonphysicians. *JAMA Intern Med.* 2021;181(7):905-912. DOI: <https://doi.org/10.1001/jamainternmed.2021.1635>
- Stentz NC, Griffith KA, Perkins E, Jones RD, Jagsi R. Fertility and childbearing among American female physicians. *J Womens Health (Larchmt).* 2016;25(10):1059-1065. DOI: <https://doi.org/10.1089/jwh.2015.5638>
- Adesoye T, Mangurian C, Choo EK, et al. Perceived discrimination experienced by physician mothers and desired workplace changes: A cross-sectional survey. *JAMA Intern Med.* 2017;177(7):1033-1036. DOI: <https://doi.org/10.1001/jamainternmed.2017.1394>
- Anspach Will E, Maslow BS, Kaye L, Nulsen J. Increasing awareness of age-related fertility and elective fertility preservation among medical students and house staff: A pre- and post-intervention analysis. *Fertil Steril.* 2017;107(5):1200-1205. DOI: <https://doi.org/10.1016/j.fertnstert.2017.03.008>
- American College of Obstetricians and Gynecologists Committee on Gynecologic Practice and Practice Committee. Female age-related fertility decline. Committee Opinion No. 589. *Fertil Steril.* 2014;101(3):633-634. DOI: <https://doi.org/10.1016/j.fertnstert.2013.12.032>
- Vollenhoven B, Hunt S. Ovarian ageing and the impact on female fertility. *F1000Res.* 2018;7:1835. DOI: <https://doi.org/10.12688/f1000research.16509.1>
- Dunson DB, Baird DD, Colombo B. Increased infertility with age in men and women. *Obstet Gynecol.* 2004;103(1):51-56. DOI: <https://doi.org/10.1097/01.AOG.0000100153.24061.45>
- Lundsberg LS, Pal L, Garipey AM, Xu X, Chu MC, Illuzzi JL. Knowledge, attitudes, and practices regarding conception and fertility: A population-based survey among reproductive-age United States women. *Fertil Steril.* 2014;101(3):767-774. DOI: <https://doi.org/10.1016/j.fertnstert.2013.12.006>
- 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):385-397. DOI: <https://doi.org/10.1093/humrep/des402>
- García D, Brazal S, Rodríguez A, Prat A, Vassena R. Knowledge of age-related fertility decline in women: A systematic review. *Eur J Obstet Gynecol Reprod Biol.* 2018;230:109-118. DOI: <https://doi.org/10.1016/j.ejogrb.2018.09.030>
- Lean SC, Derricott H, Jones RL, Heazell AEP. Advanced maternal age and adverse pregnancy outcomes: A systematic review and meta-analysis. *PLoS One.* 2017;12(10):e0186287. DOI: <https://doi.org/10.1371/journal.pone.0186287>
- Atkinson RB, Castillo-Angeles M, Kim ES, et al. The long road to parenthood: Assisted reproduction, surrogacy, and adoption among US surgeons. *Ann Surg.* 2022;275(1):106-114. DOI: <https://doi.org/10.1097/SLA.0000000000005253>
- Lundsberg LS, Pal L, Garipey AM, Xu X, Chu MC, Illuzzi JL. Knowledge, attitudes, and practices regarding conception and fertility: A population-based survey among reproductive-age United States women. *Fertil Steril.* 2014;101(3):767-774. DOI: <https://doi.org/10.1016/j.fertnstert.2013.12.006>
- 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):385-397. DOI: <https://doi.org/10.1093/humrep/des402>
- García D, Brazal S, Rodríguez A, Prat A, Vassena R. Knowledge of age-related fertility decline in women: A systematic review. *Eur J Obstet Gynecol Reprod Biol.* 2018;230:109-118. DOI: <https://doi.org/10.1016/j.ejogrb.2018.09.030>
- Daniluk JC, Koert E, Cheung A. Childless women's knowledge of fertility and assisted human reproduction: Identifying the gaps. *Fertil Steril.* 2012;97(2):420-426. DOI: <https://doi.org/10.1016/j.fertnstert.2011.11.046>

24. Wyndham N, Marin Figueira PG, Patrizio P. A persistent misperception: Assisted reproductive technology can reverse the aged biological clock. *Fertil Steril*. 2012;97(5):1044-1047. DOI: <https://doi.org/10.1016/j.fertnstert.2012.02.015>
25. Hammarberg K, Collins V, Holden C, Young K, McLachlan R. Men's knowledge, attitudes and behaviours relating to fertility. *Hum Reprod Update*. 2017;23(4):458-480. DOI: <https://doi.org/10.1093/humupd/dmx005>
26. Yu L, Peterson B, Inhorn MC, Boehm JK, Patrizio P. Knowledge, attitudes, and intentions toward fertility awareness and oocyte cryopreservation among obstetrics and gynecology resident physicians. *Hum Reprod*. 2016;31(2):403-411. DOI: <https://doi.org/10.1093/humrep/dev308>
27. Kudesia R, Chernyak E, McAvey B. Low fertility awareness in United States reproductive-aged women and medical trainees: Creation and validation of the fertility & infertility treatment knowledge score (FIT-KS). *Fertil Steril*. 2017;108(4):711-717. DOI: <https://doi.org/10.1016/j.fertnstert.2017.07.1158>
28. Peterson BD, Pirritano M, Tucker L, Lampic C. Fertility awareness and parenting attitudes among American male and female undergraduate university students. *Hum Reprod*. 2012;27(5):1375-1382. DOI: <https://doi.org/10.1093/humrep/des011>
29. Bernardi LA, Luck M, Kyweluk MA, Feinberg EC. Knowledge gaps in the understanding of fertility among non-medical graduate students. *F S Rep*. 2020;1(3):177-185. DOI: <https://doi.org/10.1016/j.xfre.2020.08.002>
30. Hickman LC, Fortin C, Goodman L, Liu X, Flyckt R. Fertility and fertility preservation: Knowledge, awareness and attitudes of female graduate students. *Eur J Contracept Reprod Health Care*. 2018;23(2):130-138. DOI: <https://doi.org/10.1080/13625187.2018.1455085>
31. Nouri K, Huber D, Walch K, et al. Fertility awareness among medical and non-medical students: A case-control study. *Reprod Biol Endocrinol*. 2014;12:94. DOI: <https://doi.org/10.1186/1477-7827-12-94>
32. Anspach Will E, Maslow B-S, Kaye L, Nulsen J. Increasing awareness of age-related fertility and elective fertility preservation among medical students and house staff: A pre- and post-intervention analysis. *Fertil Steril*. 2017;107(5):1200-1205. DOI: <https://doi.org/10.1016/j.fertnstert.2017.03.008>
33. Bavan B, Porzig E, Baker VL. An assessment of female university students' attitudes toward screening technologies for ovarian reserve. *Fertil Steril*. 2011;96(5):1195-1199. DOI: <https://doi.org/10.1016/j.fertnstert.2011.08.018>
34. Meissner C, Schippert C, von Versen-Höynck F. Awareness, knowledge, and perceptions of infertility, fertility assessment, and assisted reproductive technologies in the era of oocyte freezing among female and male university students. *J Assist Reprod Genet*. 2016;33(6):719-729. DOI: <https://doi.org/10.1007/s10815-016-0717-1>
35. Swift BE, Liu KE. The effect of age, ethnicity, and level of education on fertility awareness and duration of infertility. *J Obstet Gynaecol Can*. 2014;36(11):990-996. DOI: [https://doi.org/10.1016/S1701-2163\(15\)30412-6](https://doi.org/10.1016/S1701-2163(15)30412-6)
36. Association of American Medical Colleges. Medical School Graduation Questionnaire 2020 All Schools Summary Report. Accessed February 11, 2022. <https://www.aamc.org/data-reports/students-residents/report/graduation-questionnaire-gq>
37. Greysen SR, Chen C, Mullan F. A history of medical student debt: Observations and implications for the future of medical education. *Acad Med*. 2011;86(7):840-845. DOI: <https://doi.org/10.1097/ACM.0b013e31821daf03>
38. Medical student education: Debt, costs, and loan repayment fact card. Washington, DC: Association of American Medical Colleges; 2018. Accessed February 20, 2022. <https://students-residents.aamc.org/media/12846/download>
39. Asch DA, Grischkan J, Nicholson S. The cost, price, and debt of medical education. *N Engl J Med*. 2020;383(1):6-9. DOI: <https://doi.org/10.1056/NEJMp1916528>
40. Center for nutrition and policy promotion. Expenditures on Children by Families, 2015. 2017. Accessed February 20, 2022. <https://www.fns.usda.gov/resource/2015-expenditures-children-families>
41. Chandra A, Copen CE, Stephen EH. Infertility service use in the United States: Data from the national survey of family growth, 1982-2010. *Natl Health Stat Report*. 2014;73:1-21.
42. Jain T. Socioeconomic and racial disparities among infertility patients seeking care. *Fertil Steril*. 2006;85(4):876-881. DOI: <https://doi.org/10.1016/j.fertnstert.2005.07.1338>
43. White L, McQuillan J, Greil AL. Explaining disparities in treatment seeking: The case of infertility. *Fertil Steril*. 2006;85(4):853-857. DOI: <https://doi.org/10.1016/j.fertnstert.2005.11.039>
44. Kraus MB, Talbott JMV, Melikian R, et al. Current parental leave policies for medical students at U.S. medical schools: A comparative study. *Acad Med*. 2021;96(9):1315-1318. DOI: <https://doi.org/10.1097/ACM.0000000000004074>
45. Riano NS, Linos E, Accurso EC, et al. Paid family and childbearing leave policies at top US medical schools. *JAMA*. 2018;319(6):611-614. DOI: <https://doi.org/10.1001/jama.2017.19519>
46. Gaghan L, Parker B-T. Developing a parental leave policy in undergraduate medical education: A successful student-administration collaboration. *Acad Med*. 2022;97(7):994-998. DOI: <https://doi.org/10.1097/ACM.0000000000004577>
47. Durfey SNM, White J, Adashi EY. Pregnancy and parenting in medical school: Highlighting the need for data and support. *Acad Med*. 2021;96(9):1259-1262. DOI: <https://doi.org/10.1097/ACM.0000000000003988>
48. Bye EM, Brisk BW, Reuter SD, Hansen KA, Nettleman MD. Pregnancy and parenthood during medical school. *S D Med*. 2017;70(12):551-555.
49. Snyder RA, Tarpley MJ, Phillips SE, Terhune KP. The case for on-site child care in residency training and afterward. *J Grad Med Educ*. 2013;5(3):365-367. DOI: <https://doi.org/10.4300/JGME-D-12-00294.1>
50. Kraus MB, Reynolds EG, Maloney JA, et al. Correction to: Parental leave policy information during residency interviews. *BMC Med Educ*. 2022;57. DOI: <https://doi.org/10.1186/s12909-022-03114-2>
51. Roberts SE, Shea JA, Sellers M, Butler PD, Kelz RR. Pursing a career in academic surgery among African American medical students. *Am J Surg*. 2020;219(4):598-603. DOI: <https://doi.org/10.1016/j.amjsurg.2019.08.009>
52. Sanfey HA, Saalwachter-Schulman AR, Nyhof-Young JM, Eidelson B, Mann BD. Influences on medical student career choice: Gender or generation? *Arch Surg*. 2006;141(11):1086-1094. DOI: <https://doi.org/10.1001/archsurg.141.11.1086>