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Pregnancy attempts among adolescent and young adult cancer survivors

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Abstract

Objective: To examine whether demographic and cancer-related characteristics and factors such as fertility discussion with a medical provider and fertility preservation use are associated with attempting pregnancy after adolescent and young adult cancer.

Design: Cross-sectional online survey

Subjects: Women with lymphoma, breast cancer, thyroid cancer, or gynecologic cancer diagnosed at ages 15–39 years during 2004–2016 were identified from the North Carolina Cancer Registry and the Kaiser Permanente Northern and Southern California healthcare systems and responded to an online survey addressing survivorship concerns, including fertility and reproductive outcomes.

Exposures: Demographic characteristics, cancer characteristics, fertility discussion with a medical provider or fertility specialist between cancer diagnosis and starting cancer treatment, use of fertility preservation strategies (freezing embryos or oocytes) after cancer diagnosis

Main outcome measures: Pregnancy attempt after cancer diagnosis, defined by either a pregnancy or 12 months of trying to become pregnant without pregnancy

Results: Among 801 participants who had not reached their desired family size at diagnosis, 77% had a fertility discussion with any medical provider between cancer diagnosis and starting

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treatment and 8% used fertility preservation after cancer diagnosis. At survey (median=7 years post-diagnosis; IQR=4–10), 32% had attempted pregnancy. Neither fertility discussion with any medical provider nor fertility counseling with a fertility specialist was significantly associated with pregnancy attempts. However, use of fertility preservation was significantly associated with attempting pregnancy (PR=1.74; 95% CI: 1.312.32). Other characteristics positively associated with pregnancy attempts included younger age at diagnosis, longer time since diagnosis, having a partner (at diagnosis or at survey), and having a history of infertility prior to cancer diagnosis.

Conclusion: Use of fertility preservation strategies was uncommon in our cohort but was associated with attempting pregnancy after cancer. Ensuring access to fertility preservation methods may help adolescent and young adult cancer survivors to plan and initiate future fertility.

Keywords

Cancer survivors; adolescents and young adults; pregnancy attempts

Introduction

In the United States, estimated new cancer diagnoses among adolescents and young adults (AYAs, ages 15–39 years) exceeded 88,000 in 2021, with over half of these occurring among AYA women.(1, 2) Five-year survival for this age group has increased in recent decades and currently stands at 85%, meaning most AYAs with cancer will go on to become long-term survivors.(1) For AYA women, a cancer diagnosis may coincide with critical life decisions regarding future pregnancy and desired family size. These decisions, complex for any young adult, may be further complicated by exposure to cancer therapies and the psychological impacts of a cancer diagnosis and the possibility of recurrence.

The American Society of Clinical Oncology (ASCO) recommends that cancer patients of reproductive age receive counseling from healthcare providers to discuss the potential impacts of cancer treatments on future fertility and options for fertility preservation (e.g., freezing of oocytes or embryos).(3–5) The American Society for Reproductive Medicine (ASRM) has published similar recommendations for younger patients receiving gonadotoxic cancer treatment.(6–8) As these recommendations have gained widespread recognition, a growing number of studies have reported on rates of receipt of fertility counseling and use of fertility preservation strategies among young women with cancer.(9–15) Likewise, several population-based studies have reported rates of live births among cancer survivors and how these differ from those of the general population.(16, 17) However, little research has focused on how often AYAs attempt pregnancy after cancer, or whether fertility counseling or fertility preservation use impact the likelihood of a future pregnancy attempt, as this information is seldom available in studies with sufficient sample size or follow up to investigate these associations. Fertility-related care may allow survivors to be better informed about their fertility status and therefore influence whether they attempt pregnancy after cancer. An understanding of the factors associated with pregnancy attempts in this population may help healthcare providers to better support AYA cancer survivors and their reproductive goals.

In this study, we investigated post-diagnosis pregnancy attempts among AYA cancer survivors who had not yet reached their desired family size at the time of cancer diagnosis. The goal of our analysis was to identify factors associated with attempting pregnancy after cancer to increase the evidence base for understanding reproductive patterns in the AYA oncology population.

Materials and methods

Study design and participants

These analyses used data from the AYA Horizon Study, a cohort study focused on reproductive outcomes for young women diagnosed with cancer. The parent study and ancillary online survey have been described in detail previously.⁽¹⁸⁾ Women with an incident diagnosis of breast cancer, thyroid cancer, melanoma, lymphoma (Hodgkin lymphoma or non-Hodgkin lymphoma) or gynecologic cancer (ovarian, cervical, or uterine cancers) at ages 15–39 years during 2004–2016 were identified using data from the North Carolina (NC) Central Cancer Registry and the Kaiser Permanente Northern California and Southern California (KPNC and KPSC) Cancer Registries. The AYA Site recodes ICD-O-3/WHO definition was used to define cancer types.⁽¹⁹⁾ Both *in situ* and invasive breast cancers were included; only invasive cancer diagnoses were included for other cancer types. This research was approved by Institutional Review Boards at the University of North Carolina, KPNC, and KPSC.

Between September 2018 and November 2019, eligible women who were alive and 18 years or older were mailed letters inviting them to participate in an online survey about a broad range of survivorship topics. The 130-item survey was developed by a collaboration of oncologists, epidemiologists, psychiatrists, and other experts and has been previously published in full.⁽²⁰⁾ Of the 13,132 eligible individuals who were mailed letters inviting survey participation, a total of 1,679 completed the online survey (participation rate=12.8%). Detailed information on the characteristics of respondents and the overall invited sample have been described elsewhere.⁽¹⁸⁾ In brief, survey respondents were more likely than the overall invited sample to be White (vs. Black or Asian) and non-Hispanic (vs Hispanic) and less likely to have gynecologic cancer (vs other cancer types) and to have received surgery alone (vs any chemotherapy). For the current analysis, we excluded survey respondents who reported a history of hysterectomy, tubal ligation, or bilateral oophorectomy prior to cancer diagnosis (N=246) or were missing information on these characteristics (N=5); those missing information on post-diagnosis pregnancy attempts (N=13); and those with melanoma (N=151), who would be unlikely to be exposed to gonadotoxic therapies. Finally, we excluded those who indicated that they had already reached their desired family size at the time of their cancer diagnosis (N=460) and those with missing responses on this item (N=3). The analyses presented here thus include a total of 801 women who either had not reached their desired family size at diagnosis (N=666) or were unsure (N=135).

Outcome

The primary outcome of interest was pregnancy attempts after cancer diagnosis. In the online survey, women were asked whether they experienced infertility (12 months of trying

to become pregnant without pregnancy) after cancer diagnosis, and to list all pregnancies and pregnancy outcomes (currently pregnant, live birth, miscarriage, termination or other) and their dates. Women were considered to have a post-diagnosis pregnancy attempt if they reported either infertility or any pregnancy (regardless of pregnancy outcome) beginning after their cancer diagnosis.

Covariates

Information on cancer type, stage, and age at diagnosis came from the NC Central Cancer Registry or the KPNC/KPSC Cancer Registries. Demographic and cancer treatment characteristics were self-reported in the online survey or obtained from the cancer registries. Number of live births and infertility prior to cancer diagnosis were obtained from survey responses. Participants were asked whether they discussed their future fertility with any medical provider between cancer diagnosis and the start of cancer treatment. In a separate question, they were asked whether they saw a fertility specialist during this time window. These were treated as separate exposures in analyses to distinguish the impact of care focused specifically on fertility from possibly brief discussions about fertility that may have occurred with a non-fertility specialist during the course of cancer care. Fertility-specific care could provide survivors with more accurate information on their fertility status, and therefore could be more likely to influence future pregnancy attempts. Participants also reported whether they froze embryos and/or oocytes for fertility preservation.

Statistical analysis

Modified Poisson regression models with robust error variance were used to estimate prevalence ratios (PR) and 95% confidence intervals (CI) for pregnancy attempts. Multivariable models were adjusted for variables selected *a priori* as those we expected to be most strongly associated with pregnancy attempts (age at diagnosis, time from diagnosis to survey, partnered status at diagnosis, and number of live births before cancer diagnosis), as well as any other variables significantly associated with pregnancy attempts in unadjusted models. All participants reported that they had not gone through menopause prior to their cancer diagnosis. However, 125 women (N=41 gynecologic cancer, 76 breast cancer, 8 lymphoma) reported an age at menopause that was within 2 years of their age at diagnosis. We performed sensitivity analyses excluding these participants. All analyses were performed with SAS, version 9.4 (Cary, NC, USA).

Results

Participant characteristics are shown in Table 1. The median ages at cancer diagnosis and survey were 32 years (IQR: 27, 36) and 39 years (IQR: 34, 43), respectively. Overall, 60% were at least 6 years out from diagnosis at the time of survey. The majority were white (76%), non-Hispanic (833%), and had health insurance at the time of diagnosis (97%). More than half of participants (59%) had 0 live births before cancer diagnosis, and 15% reported prior infertility. The most common cancer diagnoses were breast (39%) and thyroid (30%), and about half had localized stage disease (49%). Initial cancer treatments included any chemotherapy (51%), radiation without chemotherapy (27%), and surgery only (21%).

Overall, 77% of women discussed future fertility with a medical provider between cancer diagnosis and starting cancer treatment (Figure 1). Across cancer types, this proportion ranged from 55% for thyroid cancer to 90% for lymphoma. In total, 17% reported fertility counseling from a fertility specialist, and 8% completed fertility preservation with either embryo or oocyte cryopreservation. Receipt of fertility counseling with a fertility specialist ranged from 1% for thyroid cancer to 27% for breast cancer, while use of fertility preservation strategies ranged from 1% for thyroid cancer to 12% for breast cancer.

A total of 259 women (32%) in the overall sample reported at least one pregnancy attempt after cancer diagnosis, with proportions ranging from 21% among women with gynecologic cancers to 49% among women with lymphoma (Table 2). While only 21% of women <6 years from diagnosis at survey had attempted pregnancy, 37% and 42% of women 6-<10 years and 10+ years from diagnosis, respectively, had done so. Outcomes of the first post-diagnosis pregnancy attempt included live birth (53%), miscarriage (22%), infertility only (14%), pregnancy termination (7%), current pregnancy (3%), and stillbirth or ectopic pregnancy (0.4%). Among the 30 women who used fertility preservation strategies and had at least one post-diagnosis pregnancy attempt, 28 (93%) reported at least one post-diagnosis pregnancy, and 9 (30%) reported at least one post-diagnosis pregnancy conceived with fertility treatments.

Associations between demographic, cancer, and reproductive characteristics and pregnancy attempts are shown in Table 2. In multivariable-adjusted models, women who were aged 35–39 (PR=0.59; 95% CI: 0.41, 0.86) years at diagnosis were less likely to attempt pregnancy than those aged 15–24 years. Women were more likely to have attempted pregnancy if they were further from diagnosis at the survey (6-<10 years vs <6 years: PR=1.56, 95% CI: 1.22, 2.00; 10+ years vs <6 years: PR=1.73, 95% CI: 1.35, 2.21). Having a partner at diagnosis (PR=1.62; 95% CI: 1.23, 2.12) or survey (PR=2.14; 95% CI: 1.48, 3.10) was also predictive of pregnancy attempts, as was prior infertility (PR=1.42; 95% CI: 1.10, 1.83). Across cancer characteristics, cancer type was significantly associated with pregnancy attempts, with survivors of gynecologic cancer (PR=0.46; 95% CI: 0.32, 0.67) and breast cancer (PR=0.60; 95% CI: 0.46, 0.77) less likely to attempt pregnancy than thyroid cancer survivors. Women with distant stage disease appeared to be more likely to have a pregnancy attempt compared to localized stage (PR=1.38; 95% CI: 1.01, 1.88), though there were few women in this group. Those with regional stage did not differ significantly from localized stage in likelihood of pregnancy attempts. Study site, race, ethnicity, education, health insurance at diagnosis, number of live births before diagnosis, and initial treatment were not strongly associated with pregnancy attempts.

Overall, neither fertility discussions with any medical provider nor fertility counseling with a fertility specialist between cancer diagnosis and starting treatment was significantly associated with attempting pregnancy (Table 3). However, women who used fertility preservation strategies were more likely to attempt pregnancy (PR=1.74; 95% CI: 1.31, 2.32).

Prevalence ratio estimates in sensitivity analyses excluding women with an age at menopause within 2 years of age at diagnosis were similar to those in primary analyses (*data not shown*).

Discussion

In this cohort of women with a history of AYA cancer who had not yet reached their desired family size at diagnosis, more than three-quarters of women reported that they had discussed fertility with any medical provider before starting their cancer treatment. However, receipt of fertility counseling (with any medical provider or with a fertility specialist) was not significantly associated with attempting pregnancy after cancer. In contrast, the use of fertility preservation strategies (embryo or oocyte freezing) was a significant predictor of post-cancer pregnancy attempts. Other characteristics that were positively associated with attempting pregnancy among survivors in our cohort included younger age at diagnosis, longer time since diagnosis, having a partner at diagnosis, and having a history of infertility.

It is encouraging that over 75% of our overall sample, and 80–90% of women with breast and gynecologic cancers and lymphoma, reported discussing future fertility with a medical provider after their cancer diagnosis and before initiating cancer treatment. Yet across cancer types, fewer than one-third reported conversations with a fertility specialist, and very few reported use of embryo or oocyte cryopreservation for preserving fertility. These results are similar to other reports documenting low rates of fertility preservation use after an AYA cancer diagnosis.(11, 14, 15) For example, among 176 women diagnosed with AYA cancer who participated in the AYA HOPE study, only 6.8% made arrangements for fertility preservation.(15) Our findings and those of others may reflect inconsistent access to fertility specialists and/or the high cost of fertility preservation methods for those without insurance coverage for these services. While the decision to preserve fertility is undoubtedly a complex and personal one, our findings highlight the importance of ensuring access to fertility specialists and embryo/oocyte cryopreservation methods for women who may wish to have children after cancer treatment.

Few studies have investigated the likelihood of pregnancy attempts among young women with a cancer history. Among 251 women with a cancer diagnosis (any type) at ages <45 years in the Fertility Information Research Study (FIRST), 21% had attempted pregnancy at a median of 2.4 years post-diagnosis.(11) Women in our cohort were, on average, older and further out from their diagnosis at the time of survey than those in the FIRST cohort. We also restricted our analyses to women who indicated that they had not yet reached their desired family size at diagnosis, and still just 36% had attempted pregnancy by a median of 7 years post-diagnosis. Even among those women who were 10+ years from diagnosis, fewer than half reported a pregnancy attempt after their cancer. It is possible that some women changed their mind in the intervening years, or still planned to attempt pregnancy at the time of our survey. Nevertheless, our results suggest a need for research to identify potential barriers to pregnancy among AYA cancer survivors and for further efforts to support women in achieving their post-cancer reproductive goals.

AYA cancer survivors in our cohort were more likely to report a pregnancy attempt if they were partnered and at least 6 years out from diagnosis at the time of survey. These findings align with the need for AYAs to reach both personal and cancer-related milestones before attempting pregnancy. Reasons for the observed association with prior infertility are less immediately clear, but this finding suggests that women with a history of unsuccessful pre-cancer pregnancy attempts may be more motivated to make additional attempts after their cancer diagnosis. In contrast, women who were older than 30 years at diagnosis and those with breast or gynecologic cancers (who tend to be older at diagnosis, on average, than those with other AYA cancers) were less likely to report a pregnancy attempt. For women at the upper end of the AYA age range, cancer diagnosis and treatment may cause them to postpone pregnancy until they are beyond their childbearing years. For those with gynecologic cancers, removal of reproductive organs during cancer treatment may also help explain the lower likelihood of pregnancy attempts. Women with more advanced cancer stage and those who received radiation or chemotherapy were not less likely to attempt pregnancy in our analyses. For clinicians, these findings highlight the importance of not assuming that female AYAs with more severe disease or more intense treatment will be less likely to attempt pregnancy in the future and therefore less likely to need fertility-related care.

In our overall cohort, receipt of fertility counseling, either with any medical provider or specifically with a fertility specialist, was not significantly associated with attempting pregnancy. However, fertility preservation, through embryo or oocyte cryopreservation, was a significant predictor of pregnancy attempts, suggesting that women who are able to access these methods and choose to use them may be more motivated and better informed about attempting pregnancy after cancer. These findings contrast with those from the FIRST cohort, in which, contrary to expectation, those who did not use fertility preservation were approximately twice as likely to attempt pregnancy as those who did (RR=2.38; 95% CI: 1.31, 4.32).⁽¹¹⁾ Further investigation may be warranted to better understand these discrepant findings and the potential impact of fertility preservation use on post-cancer pregnancy attempts.

Our analysis has some limitations. Information on fertility counseling and fertility preservation use was obtained through participant self-report and was not verified through medical records. Given the relatively long period between cancer diagnosis and survey for many women in our cohort, it is possible that some participants were unable to accurately recall whether they accessed these services. We also lacked information on fertility discussions or fertility specialist visits that occurred after cancer treatment and could therefore not assess their impact on later pregnancy attempts. Our outcome of interest, post-diagnosis pregnancy attempts, may also have been misclassified due to inaccurate recall. Because we considered all reported pregnancies to reflect pregnancy attempts, women with only unintended pregnancies after their cancer may also have been misclassified. We also did not capture attempts that did not result in pregnancy and did not meet the 1-year threshold for infertility. The overall proportion of women with a pregnancy attempt in our cohort would likely be somewhat higher if we had included those who attempted to conceive for less than 12 months but did not do so. We did not have detailed information on cancer therapies and therefore could not distinguish between women who were exposed

to potentially gonadotoxic therapies and those who were not. For women with gynecologic cancer specifically, we could not distinguish fertility-sparing surgical procedures from those that would preclude future pregnancy. Small numbers of women in certain subgroups (e.g. distant stage, uninsured at diagnosis) limited our ability to draw conclusions about associations between these characteristics and pregnancy attempts. The participation rate in the parent study was low overall (~13%), and women who chose to participate may differ in important ways from those who did not. However, with over 800 survey participants, our analysis is one of the largest studies to date to address patient-reported reproductive issues and outcomes among AYA women with cancer.

Conclusions

Reproductive issues are a priority survivorship concern for AYA women with cancer. In our cohort, use of fertility preservation strategies, but not fertility counseling, was a significant predictor of attempting pregnancy after AYA cancer. Ensuring access to fertility preservation methods may help AYA survivors to plan and initiate future fertility. Our findings on pregnancy attempts may inform the interpretation of population-based studies of birth rates after AYA cancer.

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Attestation Statement:

- Data regarding any of the subjects in the study has not been previously published unless specified.
- Data will be made available to the editors of the journal for review or query upon request.

Capsule: Among women with cancer diagnosed during adolescence or young adulthood (ages 15–39 years), use of fertility preservation strategies was uncommon but was associated with attempting pregnancy after cancer.

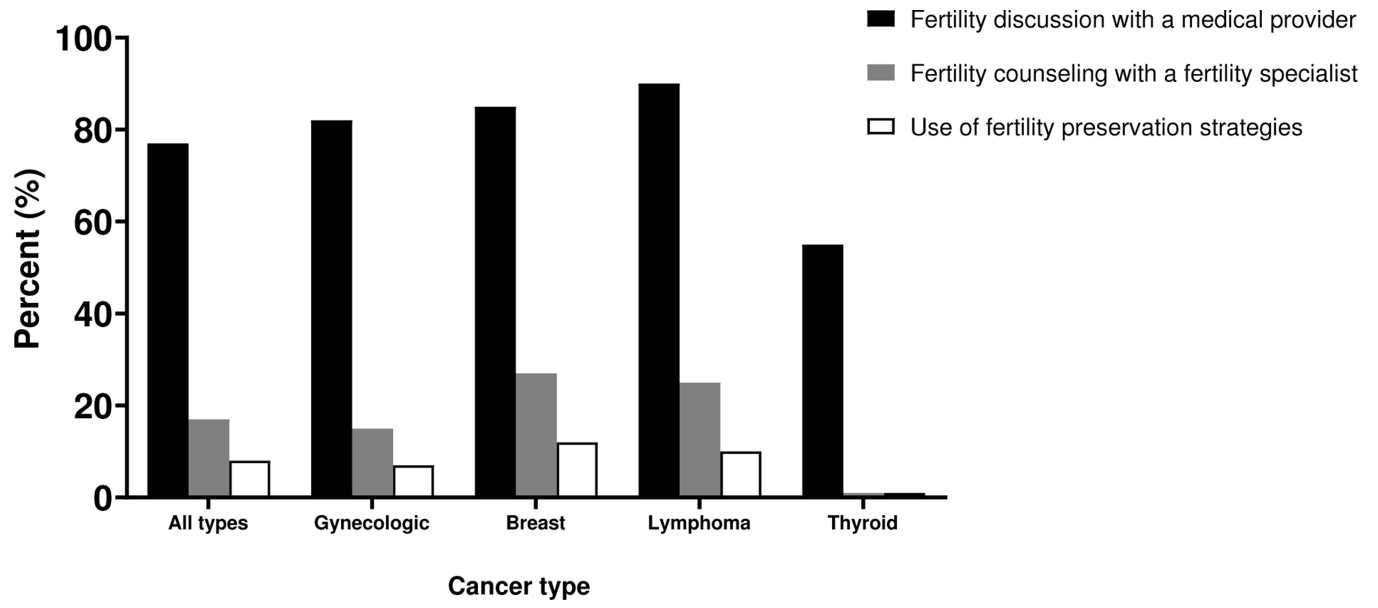


Figure 1. Fertility discussion, fertility counseling, and use of fertility preservation strategies, overall and by cancer type

Table 1.

Characteristics of Female AYA Cancer Survivors identified in North Carolina and California (n=801)

	N ^a	%
Demographic characteristics		
Study site		
North Carolina Cancer Registry	426	53%
Kaiser Permanente Northern California	179	22%
Kaiser Permanente Southern California	196	24%
Age at survey, median (IQR)	39	(34, 43)
Age at diagnosis in years		
15–24	121	15%
25–29	167	21%
30–34	237	30%
35–39	276	34%
Median (IQR)	32	(27, 36)
Years Since Diagnosis		
<6	320	40%
6–<10	257	32%
10+	224	28%
Median (IQR)	7	(4, 10)
Race		
White	577	76%
Black	41	5%
Asian	51	7%
Other	88	12%
Ethnicity		
Non-Hispanic	655	83%
Hispanic	136	17%
Education Level		
< Some College	259	33%
College	299	38%
Post Grad	233	29%
Partnered at Diagnosis		
Not Partnered	299	37%
Partnered	501	63%
Partnered at Survey		
Not Partnered	233	29%
Partnered	557	71%
Health insurance at diagnosis		
No	26	3%
Yes	775	97%

	N ^a	%
Reproductive characteristics		
Live births before diagnosis		
None	476	59%
One	189	24%
More than one	136	17%
Infertility Prior to Diagnosis		
No Prior Infertility	682	85%
Prior Infertility	118	15%
Cancer characteristics		
Cancer Type		
Thyroid cancer	243	30%
Gynecologic (cervical, endometrial, ovarian)	117	15%
Breast cancer	313	39%
Lymphoma	128	16%
Cancer Stage		
In situ (Breast only)	26	3%
Localized	367	49%
Regional	314	42%
Distant	41	5%
Unstaged	6	1%
Initial treatment		
Surgery Only	161	21%
Radiation (No Chemo)	203	27%
Chemotherapy	383	51%
No recorded treatment	11	1%

^aNs may not sum to the total due to missing responses

Table 2.

Associations between participant characteristics and post-diagnosis pregnancy attempts

	No pregnancy attempt (N=542)		Pregnancy attempt (N=259)		Unadjusted	Adjusted
	N ^a	%	N ^a	%	PR (95% CI)	PR (95% CI) ^b
Demographic characteristics						
Study site						
North Carolina Cancer Registry	290	54%	136	53%	1	1
Kaiser Permanente Northern California	116	21%	63	24%	1.10 (0.87, 1.40)	1.07 (0.85, 1.33)
Kaiser Permanente Southern California	136	25%	60	23%	0.96 (0.75, 1.23)	0.99 (0.79, 1.25)
Age at diagnosis in years						
15–24	76	14%	45	17%	1	1
25–29	88	16%	79	31%	1.27 (0.96, 1.69)	1.28 (0.99, 1.67)
30–34	159	29%	78	30%	0.89 (0.66, 1.19)	0.88 (0.64, 1.20)
35–39	219	40%	57	22%	0.56 (0.40, 0.77)	0.59 (0.41, 0.86)
Years Since Diagnosis						
<6	252	46%	68	26%	1	1
6–<10	161	30%	96	37%	1.76 (1.35, 2.29)	1.56 (1.22, 2.00)
10+	129	24%	95	37%	2.00 (1.54, 2.59)	1.73 (1.35, 2.21)
Race						
White	383	75%	194	79%	1	1
Black	29	6%	12	5%	0.70 (0.42, 1.16)	0.96 (0.62, 1.49)
Asian	39	8%	12	5%	0.87 (0.53, 1.42)	1.44 (0.89, 2.33)
Other	60	12%	28	11%	0.95 (0.68, 1.31)	1.04 (0.77, 1.39)
Ethnicity						
Non-Hispanic	451	84%	204	80%	1	1
Hispanic	85	16%	51	20%	1.20 (0.94, 1.54)	1.14 (0.92, 1.43)
Education Level						
< Some College	171	32%	88	35%	1	1
College	206	38%	93	36%	0.92 (0.72, 1.16)	1.00 (0.80, 1.25)
Post Grad	159	30%	74	29%	0.93 (0.73, 1.20)	0.98 (0.78, 1.24)
Partnered at Diagnosis						
Not Partnered	235	43%	64	25%	1	1
Partnered	306	57%	195	75%	1.82 (1.43, 2.32)	1.62 (1.23, 2.12)
Partnered at Survey						
Not Partnered	200	37%	33	13%	1	1
Partnered	335	63%	222	87%	2.81 (2.02, 3.92)	2.14 (1.48, 3.10)
Health insurance at diagnosis						
No	14	3%	12	5%	1	1
Yes	528	97%	247	95%	0.69 (0.45, 1.06)	0.80 (0.55, 1.15)
Reproductive characteristics						

	No pregnancy attempt (N=542)		Pregnancy attempt (N=259)		Unadjusted	Adjusted
	N ^a	%	N ^a	%	PR (95% CI)	PR (95% CI) ^b
Live births before diagnosis						
None	324	60%	152	59%	1	1
One	121	22%	68	26%	0.90 (0.67, 1.21)	0.73 (0.55, 0.98)
More than one	97	18%	39	15%	1.13 (0.89, 1.42)	0.97 (0.77, 1.22)
Infertility Prior to Diagnosis						
No Prior Infertility	471	87%	211	82%	1	1
Prior Infertility	71	13%	47	18%	1.29 (1.00, 1.65)	1.42 (1.10, 1.83)
Cancer characteristics						
Cancer Type						
Thyroid cancer	143	26%	100	39%	1	1
Gynecologic (cervical, endometrial, ovarian)	92	17%	25	10%	0.52 (0.36, 0.76)	0.46 (0.32, 0.67)
Breast cancer	242	45%	71	27%	0.55 (0.43, 0.71)	0.60 (0.46, 0.77)
Lymphoma	65	12%	63	24%	1.20 (0.95, 1.51)	1.16 (0.94, 1.43)
Cancer Stage^c						
In situ (breast only)	22	4%	4	2%	0.48 (0.19, 1.20)	NC
Localized	250	49%	117	49%	1	1
Regional	218	42%	96	40%	0.96 (0.77, 1.20)	0.90 (0.73, 1.11)
Distant	20	4%	21	9%	1.61 (1.15, 2.24)	1.38 (1.01, 1.88)
Unstaged	3	1%	3	1%	1.57 (0.69, 3.54)	NC
Initial treatment^c						
Surgery Only	116	23%	45	19%	1	1
Radiation (no chemo)	127	25%	76	31%	1.34 (0.99, 1.82)	1.35 (0.99, 1.81)
Chemotherapy	266	52%	117	48%	1.09 (0.82, 1.46)	1.19 (0.90, 1.56)
No recorded treatment	6	1%	5	2%	1.63 (0.81, 3.25)	NC

NC, not calculated due to small sample

^aNs may not sum to the total due to missing responses

^bModels include the listed variable of interest as well as the following covariates: age at diagnosis, time since diagnosis, partnered at diagnosis, partnered at survey, prior infertility, number of livebirths before cancer diagnosis, and cancer type

^cModels include the listed variable of interest as well as the following covariates: age at diagnosis, time since diagnosis, partnered at diagnosis, partnered at survey, prior infertility, number of livebirths before cancer diagnosis; not adjusted for cancer type due to nonoverlapping distributions of listed variable of interest and cancer type

Table 3.

Associations between fertility discussion, fertility counseling, and fertility preservation use and pregnancy attempts

	No pregnancy attempt (N=542)		Pregnancy attempt (N=259)		Unadjusted	Adjusted
	N ^a	%	N ^a	%	PR (95% CI)	PR (95% CI) ^b
Fertility discussion with a medical provider						
No	130	24%	58	22%	1	1
Yes	411	76%	201	78%	1.06 (0.84, 1.36)	1.02 (0.81, 1.28)
Fertility counseling by a fertility specialist						
No	456	84%	208	80%	1	1
Yes	86	16%	51	20%	1.19 (0.93, 1.52)	1.25 (0.98, 1.61)
Use of fertility preservation strategies						
No	511	94%	229	88%	1	1
Yes	31	6%	30	12%	1.59 (1.20, 2.10)	1.74 (1.31, 2.32)

^aNs may not sum to the total due to missing responses

^bModels include the listed variable of interest as well as the following covariates: age at diagnosis, time since diagnosis, partnered at diagnosis, partnered at survey, prior infertility, number of livebirths before cancer diagnosis, and cancer type