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Primary Care Providers' practices and attitudes towards BRCA genetic testing for unaffected 19- to 24-year-old patients.

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UNMC Genetic Counseling Program Capstone

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Abstract

Prior literature has described unique psychosocial considerations for emerging adults (18- to 25-year-olds) considering predictive *BRCA* genetic testing. Due to these unique concerns, the Society of Gynecologic Oncology (SGO) recommends waiting until individuals are older than 21 before offering testing. While primary care providers (PCPs) are important stakeholders in increasing access to hereditary cancer genetic testing, their approach for emerging adults has not been previously described.

We surveyed PCPs in Nebraska regarding their pre- and post-test clinical practices as well as attitudes towards *BRCA* genetic testing for unaffected 19- to 24-year-olds. Pre-test clinical practice questions and attitudes questions were asked twice, once for a 19- to 21-year-old patient, and once for a 22- to 24-year-old patient to evaluate for differences in PCPs approaches based on patient age. For patients who meet national guidelines (NCCN), participants responded they are initiating conversations (93.8%), providing pre-test education and ordering testing (56.3%), and disclosing positive results (55.5%). Participants had positive attitudes towards *BRCA* genetic testing with a mean attitude score of 6.38, on a scale of -18 to +18. No significant difference existed between a 19- to 21-year-old patient and a 22- to 24-year-old patient for participants' pre-test practices or attitudes. The results of this pilot study identify that PCPs in Nebraska are currently taking on an active role in *BRCA* genetic testing for unaffected emerging adults and that their approach to testing does not appear to be impacted by the SGO guidelines. PCPs may be giving more weight to the potential benefits of testing than the potential drawbacks which could impact how they frame the risks and benefits to patients. Future educational efforts for PCPs should incorporate guidance on providing anticipatory guidance, while continuing to minimize barriers to genetic counseling services for patients.

Introduction and Significance

The most common cause of hereditary breast cancer is due to mutations in the *BRCA1* and *BRCA2 genes (Yoshida, 2021)*. Individuals with a *BRCA1/2* mutation have a greater than 60% lifetime risk of developing breast cancer compared to the general population risk of 12%. Sequencing and deletion/duplication analysis of *BRCA1* and *BRCA2* (*BRCA* genetic testing) can be used to identify individuals who have mutation in one of these genes (*Genetic/Familial High-Risk Assessment: Breast, Ovarian, and Pancreatic*, 2021). When *BRCA* genetic testing was first implemented in the clinical space, most individuals receiving testing had a personal cancer diagnosis. Since then, the number of unaffected patients being tested has increased, as awareness about the benefits of *BRCA* genetic testing for unaffected individuals has grown. From 2004 to 2014, in a retrospective cohort of 53,254 adult women who received genetic testing, the percentage of unaffected females receiving *BRCA* genetic testing increased from 24.3% to 61% (Guo et al., 2017).

One motivator for unaffected patients who choose to undergo *BRCA* genetic testing is the ability to do earlier and more frequent breast surveillance. The National Comprehensive Cancer Network (NCCN) recommends that *BRCA* positive individuals begin annual breast MRIs at 25, or 10 years before the earliest breast cancer diagnosis in their family (whichever comes first), and then alternate with mammograms every 6-12 months starting at age 30. For those under the age of 25 who test positive for a *BRCA* mutation, recommendations include increased breast awareness and education about healthy lifestyle choices. Additionally, providers should begin to have conversations about the benefits and risks oral hormonal contraceptive for *BRCA* positive patients. However, before the age of 25, no breast imaging is recommended for screening for *BRCA* positive patients, as the age related risk to develop breast cancer before 25 is

low (Antoniou et al., 2003; Warner, 2018). Prior studies have described that for unaffected 18- to 24-year-olds who test positive for a *BRCA* mutation, the time spent waiting for breast surveillance to begin is a source of frustration and anxiety. Some patients have described regretting their decision to test before the age of 25, while others have described wishing they had just been better prepared and informed. For these reasons, both patients and genetic counselors have highlighted the importance of reviewing management options during pre-test counseling (Brunstrom et al., 2016; Evans et al., 2016; Young et al., 2019).

Patients between the ages of 18 and 24-years-old are also considered to be at a unique developmental stage called emerging adulthood. Emerging adulthood is characterized by marked differences in independence and relationships (Arnett, 2000). The effect these differences have on emerging adults seeking genetic counseling has been reported in the literature. A recent survey of genetic counselors working with emerging adults, found that genetic counselors reported that this population more often brought their parents to appointments, and that the genetic counselors felt more compelled to explore emerging adults' motivation for accessing testing (Young et al., 2017). This is supported by a 2019 study which found that while 57% of 18- to 30-year-olds receiving testing for a hereditary cancer syndrome felt their decision was autonomous, individuals who were between 18- and 25-years-old were more likely to report parental pressure in their decision (Godino et al., 2019).

In addition to the impact of familial influence, other differences regarding the needs of emerging adults in genetic counseling have been reported. Emerging adults have reported wanting more genetic information and support in understanding their genetic risk (Patenaude et al., 2013). Genetic counselors have also reported the importance of addressing insurance concerns with this population, as many do not yet

have established life insurance, which is not protected under the Genetic Information Non-discrimination Act of 2008 (GINA). Although for some emerging adults this does not dissuade them from testing, others have opted to wait because of insurance concerns (Young et al., 2019).

Prior qualitative studies have interviewed emerging adults about their experiences navigating the genetic testing process, and studies have examined genetic counselors' perspectives on the counseling needs of this population. Describing PCPs' current approach to testing is important given their increasing role in the genetic testing process. Additionally, areas previously identified as challenges for PCPs may be enhanced when working with emerging adults.

For example, literature has identified gaps in PCPs' knowledge regarding genetics concepts and *BRCA* mutations and this is an area where emerging adults have reported wanting more support. A 2017 study found that 35% of primary care providers had high confidence in their knowledge regarding Hereditary Breast and Ovarian Cancer (HBOC) and that 53% of providers could correctly answer knowledge questions on HBOC. These knowledge questions looked at topics such as inheritance, risk to relatives, and clinical application questions which asked providers to assess if a patient was at risk (Nair et al., 2017). These results were further supported by a 2020 study which found 44% of providers were completely confident in discussing *BRCA1/2* inheritance with patients (Dekanek et al., 2020).

Additionally, studies have highlighted that PCPs may not consistently explore the psychosocial impacts of genetic testing with patients. A 2015 study that surveyed non-genetic healthcare providers about their pre-test practices found that 51% of providers did not regularly discuss the possible emotional and social impact of testing with patients (Vadaparampil et al., 2015). A later study reported that while 71% of non-

genetic health professionals felt responsible for managing patient emotions, between 20 and 36% responded that they found this task challenging (Douma et al., 2016). In qualitative studies of emerging adults navigating the *BRCA* genetic testing process, participants have described desiring additional support in processing what their results mean for themselves and future relationships (Hoskins & Werner-Lin, 2013; Werner-Lin et al., 2012).

Because of the unique circumstances emerging adults face when undergoing *BRCA* genetic testing, questions have been raised as to whether *BRCA* genetic testing should be routinely ordered for women under 25 who meet national criteria for testing. In 2015, the Society of Gynecologic Oncology (SGO) recommended that providers consider waiting until unaffected patients are over the age of 21 before offering *BRCA* genetic testing (Lancaster et al., 2015). There is some evidence for this approach in the literature, as the most prevalent negative outcome reported by patients between the age of 18 and 24, who had undergone testing, was the time spent waiting for screenings to begin. However, patients under the age of 21 have also reported not regretting their decision to pursue predictive genetic testing, highlighting the certainty they gained by knowing their *BRCA* status (Brunstrom et al., 2016; Evans et al., 2016). The National Society of Genetic Counselors (NSGC) currently does not have specific practice guidelines regarding this patient population but rather endorses each patient making an informed decision after discussing the benefits and limitations of testing with a provider (Berliner et al., 2021). Currently, it is unknown how the SGO guidelines impact PCPs' approach to predictive *BRCA* genetic testing. However, in a 2020 study investigating the knowledge and opinions of PCPs on *BRCA* genetic testing, 70% of the respondents reported that evidence base guidelines impact their decision to incorporate *BRCA* genetic testing into their practice (Dekanek et al., 2020). Additionally, a 2011 study

which used patient vignettes to assess providers clinical practices, found that 57% of OB/GYNs and 34% of Family Medicine providers adhered to guidelines for genetic testing (Trivers et al., 2011).

Research has indicated that the age at which *BRCA* genetic testing is initiated for patients is decreasing and that it is the most frequently ordered hereditary cancer genetic test. (Bajguz et al., 2021; Guo, Scholl, Fuchs, Berenson, & Kuo, 2020). However, there is a gap in the literature regarding how PCPs approach *BRCA* genetic testing for unaffected patients under the age of 25. Investigating this gap is important as some of the previously identified challenges for PCPs consenting patients to *BRCA* genetic testing may be amplified when working with emerging adults due to their unique developmental needs and medical management concerns. Additionally, in February of 2022, the President's Cancer Panel released recommendations in conjunction with project Moonshot with the aim of "Closing Gaps in Cancer Screenings". Recommendation 3.2 specifically addressed increasing access to genetic testing and counseling with two of the three goals aiming to increase PCPs education and ability to consent and order testing for patients. While there are ongoing educational efforts to support PCPs in cancer genetic testing, none specifically focus on consenting and ordering *BRCA* testing for unaffected emerging adults. Describing the approaches and attitudes of PCPs towards this patient population can provide the opportunity to identify if additional provider education is needed. Additionally, in describing PCPs' practices and attitudes, it is important to also understand if there are differences in PCPs' approaches based on if the patient is under or over the age of 21 given previous recommendations.

Methods

Recruitment. For this study eligible PCPs were identified through the University of Nebraska Medical Center's College of Public Health's Health Provider Tracking Service (HPTS) database. PCPs were eligible to complete the survey if their primary practice location was in Nebraska and if they were an obstetrician-gynecologist (MD/DO), women's health nurse practitioner, certified nurse midwife, or a physician assistant who primarily worked in a women's healthcare office. 293 eligible providers were identified through the HPTS; one was excluded because they were involved in the development of the survey.

Recruitment fliers were mailed to 292 providers at the address listed in the HPTS database. The fliers included a brief description of the study with a QR code and URL to access the survey online. Providers had the option to share their email address in a Microsoft Form at the end of the survey to win one of two $25 gift cards. Gift card winners were selected via a random number generator. This study was approved and deemed exempt by the University of Nebraska Medical Center Institutional Review Board, IRB# 0463-22-EX.

Survey Development. The survey was developed in Qualtrics and contained three sections: demographics, clinical practices, and attitudes. Demographic variables included the provider's gender, age, practice location and type, specialty, and if they had ever ordered *BRCA* genetic testing for a 19- to 24-year-old patient.

All clinical practice and attitude questions stated that for the scenario provided that the patient in question was a cisgender female. This was done to minimize confounding variables that could arise based on a patient's gender identity. Additionally, since the age of majority is 19 in Nebraska, providers were only asked about patients between the ages of 19 and 24, to limit any confounding variables regarding parental consent. Participants were also asked pre-test clinical practice questions and attitude

questions twice, once for a 19- to 21-year-old patient and once for a 22- to 24-year-old patient. These questions were asked twice to evaluate for differences in PCPs' approaches based on patient's age.

The clinical practice section included ten multiple-choice questions to assess how the provider might approach specific patient encounters and what factors may influence them. These questions asked about the provider's pre- and post-test practices for 19- to 24-year-old patients. Questions about pre-test practices included if the provider would initiate a conversation about genetic testing, order genetic testing, and/or refer the patient for genetic counseling if they met national criteria for testing. Post-test practice questions focused on if the provider would refer to a genetic counselor for post-test counseling and/or result disclosure.

Respondents' attitudes toward predictive *BRCA* genetic testing for 19- to 24-year-old patients were measured through a series of Likert scales which assessed their views on potential benefits or drawbacks of testing. The questions asked about "potential" outcomes, as not every patient will experience the same benefits or drawbacks of testing. For each patient population, the provider completed two Likert scales (a total of four Likert scales), each with six questions. The first scale asked the provider to what extent they viewed a potential outcome of predictive *BRCA* genetic testing as a benefit. The second scale asked the provider to what extent they viewed a potential outcome of *BRCA* genetic testing as a drawback.

The items on the Likert scales were developed by modifying the *Attitudes Towards Genetic Testing for BRCA1/2 (ATGT-BRCA1/2)* Scale (Bouhnik et al., 2017). Each Likert scale item was scored from zero (strongly do not consider a benefit/drawback) to three (strongly do consider a benefit/drawback). An attitude score for each participant was calculated for both 19- to 21-year- old patients and 22- to 24-

year-old patients. Attitude scores were calculated by subtracting the total drawback score from the total benefit scores (benefits minus drawbacks). Possible scores ranged from +18 (very positive attitudes) to -18 (very negative attitudes). Participants' attitude scores were then averaged to find an overall mean attitude score for 19- to 21-year-olds and 22- to 24-year-olds.

Finally, there was one free-response question where the provider could share their experiences with ordering *BRCA* genetic testing for emerging adults. This was an optional question.

Analysis. Demographic data and clinical practices were analyzed using descriptive statistics, frequencies, and percentages. If there was not an observed difference (n>1) in participants' pre-test clinic practices between 19- to 21-year-old patients and 22- to 24-year-old patients, then participants' responses between the two patient groups were averaged for each question.

Participants' attitudes were analyzed using descriptive and inferential statistics. Wilcox rank sign test at $p<0.05$ was used to evaluate for statistical significance between the participants' attitudes scores for 19- to 21-year-olds and 22- to 24-year-olds. If no statistical significance existed, participants' responses between the two patient groups were individually averaged, for each item on the Likert Scale, before calculating the overall mean attitude score as previously described.

Free response questions were not formally coded or analyzed.

Results

Demographics. Nineteen PCPs began the survey. Of these, three completed only the demographic questions, and an additional three stopped the survey after the clinical practice questions (did not complete the attitude questions) for a response rate of 4.5% (13/292). Responses from the three PCPs who stopped after the clinical

practice questions are included in the demographics and descriptive statistics for the clinical practice questions. Of the 16 respondents, eight reported being an OB-GYN (MD/DO) and eight reported being an advanced practice provider who worked in gynecology or obstetrics: one nurse midwife, five nurse practitioners, and two physician associates/assistants. 85.7% of respondents (12/14) indicated they had previously ordered *BRCA* genetic testing for an unaffected 19- to 24-year-old patient. See Table 1 for complete demographic information.

Clinical Practice.

Pre-test. There were no observed differences between respondents' pre-practices for 19- to 21-year-old patients and 22- to 24-year-old patients. An average of 93.8% of participants (15/16) responded that they were very likely to initiate a conversation about *BRCA* genetic testing for an unaffected 19- or 22-year-old patient whose mom has tested positive for a *BRCA1* variant. An average of 56.3% of respondents (9/16) said they were very likely or somewhat likely to provide pretest education and order testing for a 19- to 24-year-old patient who met national criteria for testing. An average of 40.6% of respondents (6.5/16) said they would refer a 19- to 24-year-old patient to a genetic counselor for pre-test education and test ordering.

Post-test[1]. Out of the nine respondents who said they would order testing, one (11.1%) said they would review a positive result with their patient, four (44.4%) said they would review the result and provide their patient with information about genetic counseling, and four (44.4%) said they would refer the patient to a genetic counselor. For either a negative or VUS, four (44.4%) said they review the result with the patient,

[1] Participants were only asked posttest practice questions once, for a 19- to 24-year-old patient, so responses in this section are not averages.

four (44.4%) said they provide the patient with information about genetic counseling, and one (11.1%) said they would refer the patient to a genetic counselor.

Factor Affecting Clinical Practices. Figure 1 illustrates the number of respondents who endorsed each listed factor as an influence in their decision to initiate conversations in the previous clinical scenarios; participants could endorse more than one factor. The two most common responses were familiarity with guidelines (n=10) and comfort with discussing testing (n=11). Only one respondent indicated the patient's age played a role in their decision to initiate a conversation about testing. Two respondents selected "other" and indicated that the mother's known mutation was a factor in their decision to initiate a conversation with the patient. When asked about their comfort with discussing *BRCA* genetic testing with a 19-year-old and a 22-year-old patient, 56.3% (9/16) of respondents said they were very comfortable. Of note, of the nine respondents who said they would order genetic testing for both patients, all reported being very comfortable with discussing genetic testing. Additionally, all seven respondents who indicated they worked in private practice, indicated that they would order testing, while only two of the eight hospital-based respondents endorsed ordering testing without referring to a genetic counselor.

Attitude scores. The average attitude score for 19- to 24-year-old patients was 6.38, on a scale of -18 to + 18, were scores >0 indicate positive attitudes. There was not a statistically significant difference between the attitude scores for 19- to 21-year-old patients and 22- to 24-year-old patients by Wilcox rank sign test $p < 0.05$ ($p=0.14$).

For potential benefits of tests, participants most frequently selected, 3, strongly consider a benefit, or 2, mostly consider a benefit. For potential drawbacks of testing particpants most frequently selected 2, mostly consider a drawback, or 1, mostly do not

consider a drawback of testing. Figures 2 and 3 illustrate participants' responses to individual items on the attitude scales.

Free responses. Three respondents shared written responses to the question that asked if they had anything else they wanted to share about their experience with *BRCA* genetic testing for 19- to 24-year-old patients. Two of the responses fell under the theme of clinical practices and one fell under the theme of attitude. The clinical practice theme included challenges in either ordering testing or referring patients to genetic counselors. Attitude responses included respondents' perception of the importance and implications of the *BRCA* genetic testing for the patients.

Discussion

The aim of this pilot study was to describe current practices of PCPs regarding *BRCA* genetic testing for unaffected 19- to 24-year-old patients. Previous data has suggested that while PCPs are providing pre-test education and ordering genetic testing, patient demographics can influence the provider's approach to genetic testing (Trivers et al., 2011). However, it was unclear whether a patient's age and access to breast surveillance based on screening guidelines altered their practices. We found that PCPs who participated in this pilot study are initiating conversations with and ordering *BRCA* genetic testing for emerging adults. No PCP surveyed responded that the patient would be too young for testing, and only two respondents selected that the patient's age influenced their decision to discuss testing. Over half of the PCPs in this study (56.3%, n=9) responded that they would perform the pre-test education and order *BRCA* genetic testing for a patient who met NCCN criteria rather than referring to a genetic counselor for that purpose. This is consistent with previous studies that have shown that non-genetic providers are increasingly ordering testing for patients (Bajguz et al., 2021). A 2014 study exploring genetic counseling service delivery models found

that 54% of genetic counselors reported not having initial contact with patients until after testing was already performed (Cohen et al., 2013; Trepanier & Allain, 2014). Of the respondents in our study who order genetic testing for their patients, only 44.4% indicated that they would refer their patient to a genetic counselor to discuss a positive result. An equal number of respondents selected that they would disclose the positive result, and then provide the patient with information about genetic counseling if interested. However, studies have illustrated that there is often low uptake from patients even when directly referred to genetic counseling, although many of these studies focused on referrals for pre-test counseling only (Kne et al 2017). While previous studies have indicated that PCPs have knowledge regarding management for *BRCA* positive patients, given the implications of a positive result and the potential psychosocial effects, it is important that these patients have an opportunity to discuss testing with a provider who is also confident providing emotional support. As prior studies have illustrated that providing psychosocial support is an area where PCPs are less comfortable, future research should examine the psychosocial outcome of emerging adults undergoing the genetic testing process without the involvement of a genetics provider (Douma et al., 2016).

In addition to describing current clinical practices, this pilot study explored PCPs' attitudes towards *BRCA g*enetic testing for unaffected emerging adults by assessing their views on the potential benefits and drawbacks of testing. Respondents had overall positive attitudes, which is consistent with previous studies that found PCPs have positive attitudes towards predictive *BRCA* genetic testing (Bouhnik et al., 2017; Escher & Sappino, 2000). However, our respondents' positive attitudes were a result of them more strongly, and frequently endorsing potential benefits of testing when compared to potential drawbacks. For example, 84.6% of respondents strongly considered

opportunities for screening as a benefit of testing, but only 15.4% strongly considered frustration at waiting for screening to begin as a drawback. While it is encouraging that PCPs appreciate the benefits of testing for this population, it is essential that patients considering testing are provided with balanced pretest education about the benefits and risks. Emerging adults have previously reported lack of access to screening as a source of unexpected frustration (Brunstrom et al., 2016; Evans et al., 2016; Young et al., 2019). Guidelines recommend that providers review medical management implications when providing pretest counseling, however these guidelines do not specifically mention counseling on potential psychosocial implication of medical management. Our participants' attitudes towards frustration at lack of access to screening may indicate that PCPs may be unaware of the impact that waiting for screening to begin can have on patients (Force et al., 2019; "Hereditary Cancer Syndromes and Risk Assessment: ACOG COMMITTEE OPINION, Number 793," 2019). Developing guidelines that highlight specific counseling considerations, like reviewing the potential psychological impacts of not having immediate access to breast screenings, can help to ensure that emerging adults are able to make an informed decision about testing.

As with prior studies, the results of this study also identified potential areas for education regarding insurance. 38.5% of respondents felt that health insurance discrimination was a potential drawback of testing and 30.8% of respondents marked that life insurance discrimination was **not** a drawback of testing. However, under the Genetic Information Non-Discrimination Act (GINA), patients are routinely protected from health insurance discrimination, but not from life insurance discrimination. Patients should be properly counseled about insurance implications and risks in order to make an informed decision about testing. This is especially important for 19- to 24-year-old patients, who may not have a life insurance policy in place.

The survey was designed to also assess if PCPs have different practices or attitudes between 19- to 21-year-old or 22- to 24-year-old patients, given practice recommendations by the SGO. Since the SGO's recommendations were published in 2015, no additional guidelines have been released on counseling emerging adults regarding *BRCA* genetic testing. While familiarity with guidelines was the second most endorsed influence on initiating a conversation about testing in this study, it does not appear that the recommendations have influenced PCP practices or attitudes. For both patient demographics, nine PCPs said they would initiate a conversation and were comfortable discussing testing with patients. For the participants who responded they would order testing, there was no difference in how likely they were to order testing between the demographics. Additionally, there was not a statistically significant difference between attitude scores for 19- to 21-year-old patients and 22- to 24-year-old patients by Wilcox Sign Rank Test. Given that there have been previous recommendations for providers to not offer patients testing until they are the age of 21, it is encouraging to see that PCPs still view testing as positive for this demographic. Patients under the age of 21 have previously highlighted the benefits that testing has had for themselves, and NSGC supports the rights of all patients over the age of 18 to have access to testing.

Limitations. While there are strengths to this pilot study, like the diversity of providers' training, location, and practice type, there are important limitations to consider. A low response rate and small sample size decrease the generalizability of the results. Additionally, while inferential statistics were performed on attitude scores, the statistical power is low. Another consideration is that the sample may have been subject to self-selection bias. Since 85.7% of participants in the sample stated they had previously ordered genetic testing for 19- to 24-year-olds, those who had experience

ordering testing for this population may have been more likely to respond to the study. Therefore, this study may not have captured the clinical practices and attitudes of PCP with less experience.

Future Directions. This pilot study has identified that PCPs are ordering *BRCA* genetic testing for unaffected emerging adults. Future studies should focus on repeating this study with a larger sample to overcome the limitations of these results as well as repeating this study to compare across age groups of 19- to 24-year-olds and 25- to 30-year-olds to further characterized if clinical practices and attitudes are impacted by patient access to recommended screenings. Additionally, given that PCPs are providing pre-test education, future studies comparing pre-test counseling by a genetic counselor versus primary care provider for emerging adults would be of interest. Recent mother-daughter studies investigating needs regarding *BRCA* genetic testing have highlighted patients' desire to have a genetic counselor as a part of the conversation (Jennings et al., 2022). While PCPs play an important role in increasing access to genetic counseling, it is also important that patients who require additional support in the counseling process can access it.

Practice Implications. The results of this study identify that PCPs could benefit from additional education regarding some of the unique counseling considerations for this population, like anticipatory guidance about waiting for breast screenings to begin. Future education efforts targeting PCPs should consider incorporating information to support providers discussing *BRCA* genetic testing with emerging adults. Respondents' free-responses highlighted that PCPs acknowledge the importance of testing for patients in this demographic while also understanding challenges to scheduling patients. Although emerging adult patients may benefit from seeing a genetic counselor for pre-test education, it may also be a barrier to testing. The majority of respondents in

this study endorsed that national guidelines influenced their decision to offer testing for patients. In addition to focused education, practice guidelines could be created to better outline information what PCPs should review when consenting an emerging adult to testing. This may help to identify patients who may benefit from additional genetic counseling, while also empowering patients to still have easier access to genetic testing.

Conclusion. This pilot study is the first to describe the current clinical practices and attitudes of PCPs regarding *BRCA* genetic testing of unaffected emerging adults. The results highlight that PCPs have positive attitudes towards testing and are currently ordering testing and providing pre-test education for this patient population. However, PCPs variable responses to potential drawbacks of predictive testing for emerging adults highlights that they may not be providing comprehensive pre- or post-test counseling. As the age at which *BRCA* genetic testing is initiated continues to decrease, PCPs may increasingly become involved in ordering testing for emerging adults. Future efforts should focus on continuing to support increased access to testing, while minimizing harm to patients through provider education and potentially more structured guidelines for pre-test education for patients.

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Table 1. Demographic variables of participants.

Demographics	n
Age (n=16)	
30 to 39 years	4
40 to 49 years	9
50 to 59	2
70+	1
Gender (n=16)	
Female	15
Male	1
Practice setting (n=16)	
Outpatient Private Practice	7
Outpatient Affiliated w/ Hospital	8
Other – Community Clinic	1
Location (n=16)	
Urban	8
Suburban	6
Rural	2
Specialty (n=16)	
OB-GYN (MD/DO)	8
Nurse Practitioner	5
Certified Nurse Midwife	1
PA	2
Have you ever ordered BRCA genetic testing for an unaffected 19- to 24-year-old (n=14)	
Yes	12
No	2

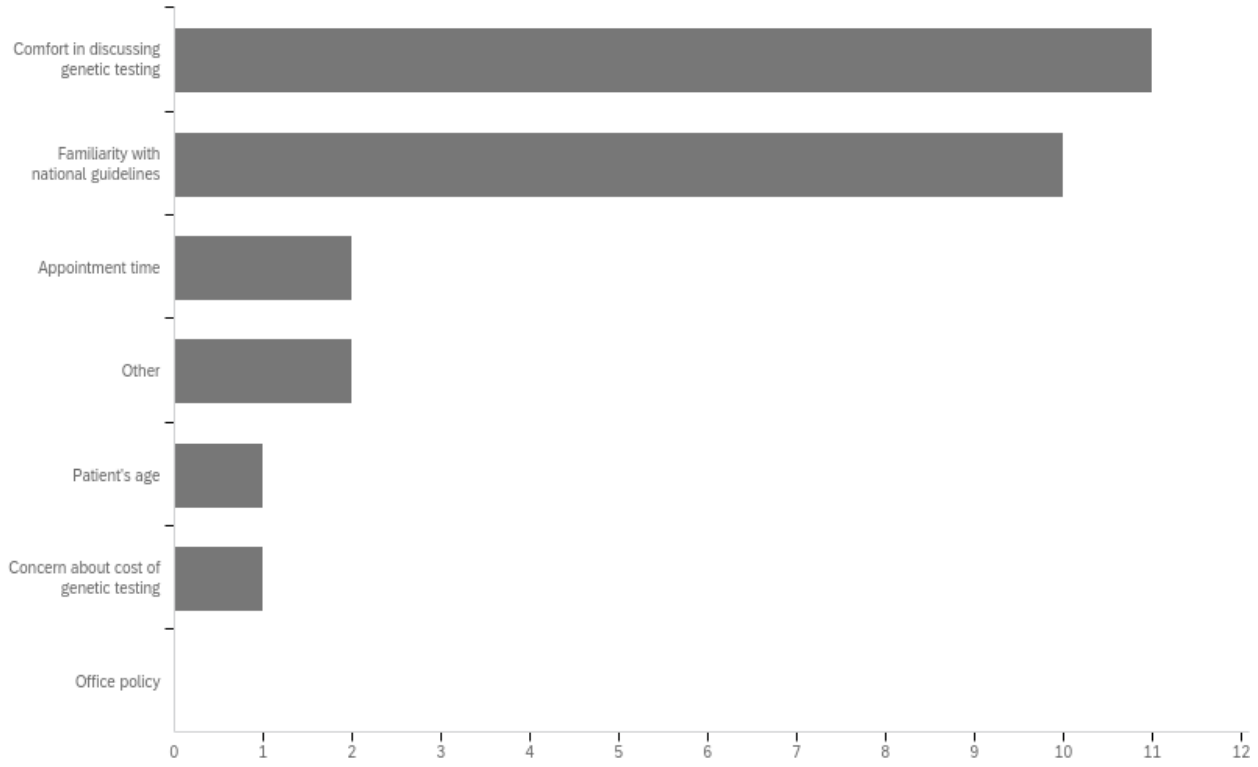

Figure 1. Factors that Influenced PCPs decision to initiate a conversation about *BRCA* Genetic Testing. Illustrates factors that influenced respondents decision to initiate a conversation about predictive BRCA genetic testing with a patient who met national guidelines. Respondents could select more than one response.

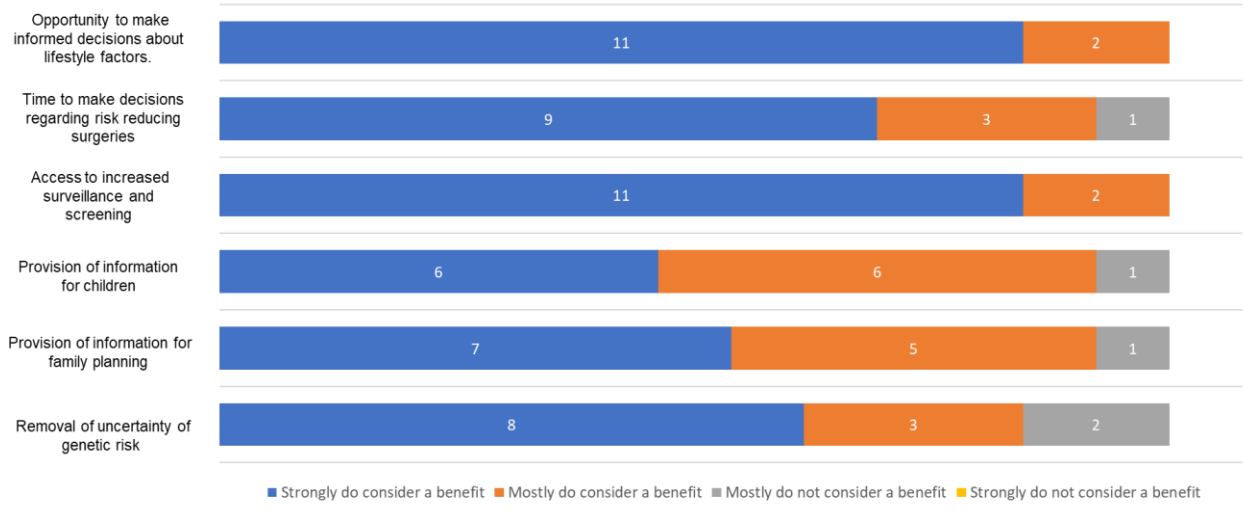

Figure 2. Attitudes Towards Potential Benefits of Predictive *BRCA* Genetic Testing. The bar graph illustrates particpants (n=13) attitudes to each potential benefit of *BRCA* genetic testing for 19- to 24-year-old patients on a scale from strongly considered a potential benefit to strongly do no consider a potential benefit. Particpants attitudes to each potential benefit where averaged between their response for 19- to 21-year-old patients and 22- to 24-year-old patients as there was not a statistically signficant difference in attitude scores between patient demographics.

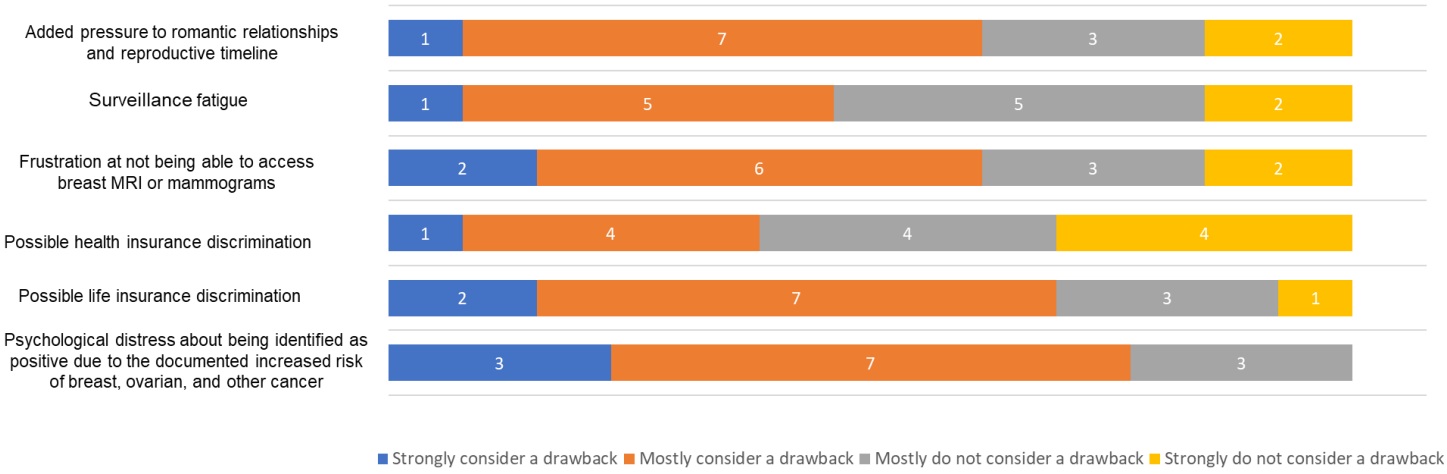

Figure 3. Attitudes Towards Potential Drawbacks of Predictive *BRCA* Genetic Testing. The bar graph illustrates particpants (n=13) attitudes to each potential drawback of *BRCA* genetic testing for 19- to 24-year-old patients on a scale from strongly considered a potential drawback to strongly do no consider a potential drawback. Particpants attitudes to each potential drawback where averaged between their response for 19- to 21-year-old patients and 22- to 24-year-old patients as there was not a statistically signficant difference in attitude scores between patient demographics.

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