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# Who Gets An Iud: The Impact Of Patient Race And Number Of Past Sexual Partners On Clinical Decisions To Prescribe Intrauterine Devices

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Who Gets an IUD: the impact of patient race and number of past sexual partners on clinical decisions to prescribe intrauterine devices

Submitted to the Social and Behavioral Sciences Department of the Yale School of Public Health  
in partial fulfillment for the Degree of Master of Public Health

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## **Abstract**

While disparities by race/ethnicity in reproductive and sexual health outcomes are well documented, the role that healthcare providers play in contributing to these disparities is only beginning to be explored. This investigation sought to examine medical and nursing students' bias surrounding the prescription of intrauterine devices (IUDs, i.e., long-acting reversible contraception) to adolescents based on the patient's race and sexual history. An online survey presented participants with a clinical vignette of an IUD-seeking sexually active adolescent, with the patient's race and number of past sexual partners systematically manipulated. Participants reported predictions about patient risk of getting pregnant with and without an IUD, patient risk of HIV/STI, willingness to prescribe IUD, and other clinical judgments. Analyses revealed that the patient with multiple partners was rated as more likely to get pregnant without an IUD and acquire HIV/STI than a patient with a single partner, although the prescription rates were similarly high across conditions. Further analyzing the impact of socio-demographic characteristics of providers revealed that White providers were more likely to find it appropriate to prescribe an IUD and to rate a sexually active adolescent at high risk of pregnancy without an IUD than non-White providers. Lastly, non-White providers were significantly less likely to prescribe to White adolescents than Black adolescents. These findings suggest that it is important to examine the extent to which both patient and provider's characteristics contribute to differences in access to and utilization of contraceptive methods, as well as to determine what types of interventions might alleviate differences in prescription habits and assumptions about patients, in order to address health care disparities.

## Background

While disparities by race/ethnicity in reproductive and sexual health outcomes are well documented, with Black women experiencing higher rates of maternal mortality, infant mortality and unintended pregnancies and lower rates of preventive care,<sup>1-3</sup> the role that healthcare providers play in contributing to these disparities is only beginning to be explored.<sup>4, 5</sup> With regard to contraceptive care specifically, several studies have observed that Black women are more likely to receive safe sex and birth control counseling than White women, regardless of the patients' sexual behaviors.<sup>6, 7</sup> However, a recent study with low-income women found that Black women were significantly less likely than whites,<sup>8</sup> a highly effective contraceptive method with a pregnancy rate of less than 1% for perfect and typical use.<sup>9</sup> More broadly, from 2006 to 2013, the use of long-acting reversible contraception, which includes IUDs, increased at a rate of 128% for non-Hispanic White women and only 30% for non-Hispanic Black women.<sup>10</sup>

Although patient- and system-related factors influence these findings, the presence of these contrasting results and disparities potentially raises the concern that healthcare providers may be differentially promoting and prescribing IUDs based on patient race. Past studies have suggested that providers might be more likely to encourage the use of highly effective contraceptive methods to minority patients, in order to potentially counter the higher rates of unintended pregnancy and lower use of contraceptive methods among these women.<sup>6</sup> For example, physicians provided with clinical vignettes in a past study were more willing to electively sterilize Black women than White women.<sup>11</sup> On the other hand, consistent with the racial disparities witnessed with other forms of medical care, others have proposed that providers might be less likely to offer certain effective contraceptive methods to minority women, due to

their speculation that these women would increase their sexual risk-taking behavior (e.g. decrease their condom use, or increase the number of sexual occurrences and partners) and consequent risk for HIV and sexually transmitted infections (STIs) due to a perceived decrease in susceptibility to pregnancy with contraception.<sup>12, 13</sup> We will refer to these behaviors as sexual risk compensation.<sup>14-16</sup>

Regardless of providers' assumptions about patients' sexual behaviors, in 2012, the American College of Obstetricians and Gynecologists (ACOG) issued guidelines that implants and IUDs should be offered as first-line contraceptive options for sexually active adolescents.<sup>17</sup> Increasing the use of these methods could play an important role in preventing unintended pregnancy and abortion in teens, thus reducing the teenage pregnancy rate in the United States, which is higher than that of most developed countries.<sup>18</sup> Of the 42% of American adolescents aged 15-19 that have sexual intercourse, many do not use contraceptive methods, or they use methods with high typical use failure rates (e.g. condoms or oral contraceptive pills).<sup>19</sup> In 2013, only 1.6% of American adolescents aged 15-19 reported using IUDs or implants, with racial differences in utilization existing: 1.9% of non-Hispanic Whites compared to 1.1% of non-Hispanic Blacks.<sup>20</sup> Given the role of contraception in reproductive health, it is also important to note the existing race-based disparities in reproductive health outcomes among adolescents: Black adolescents have a pregnancy rate that is more than twice the rate of their White peers and an abortion rate that is more than three times the rate for Whites.<sup>21, 22</sup>

While many factors might contribute to adolescents' non-use of IUDs, research suggests that health care providers play a role by not consistently recommending or prescribing IUDs to adolescents.<sup>23</sup> However, to date, little is known about biases affecting health care providers' willingness to prescribe IUDs to adolescent patients with diverse backgrounds, particularly

biases surrounding race and other characteristics that clinicians might associate with patients' sexual risk, such as their number of sexual partners. Although ACOG states that it is appropriate for women with high risk of STIs (which includes women both under the age of 25 and with multiple partners) to be screened for STIs and placed with IUD on the same day the test results are available,<sup>24</sup> providers have previously been less likely to prescribe IUDs to women that are not in monogamous relationships.<sup>23, 25</sup> As IUDs are currently being advocated as a means to decrease teenage pregnancy,<sup>26</sup> it is important to understand whether differences in provider recommendations by race and number of past sexual partners exist and, if so, consider how these differences may affect efforts to promote IUDs for different adolescent patients.

To investigate provider bias surrounding the prescription of IUDs based on patient race and sexual history, we conducted a study of providers' recommendations using clinical vignettes of patients of different races and number of past sexual partners. Based on previous findings and the current IUD utilization rates by race, we hypothesized that providers would 1) be more likely to prescribe to a White adolescent patient compared to a Black patient, 2) be more likely to prescribe to a patient with a single partner compared to a patient with multiple partners, and 3) be most willing to prescribe an IUD to a White patient with a single sexual partner. Lastly, we sought to clarify whether the providers' race influences IUD prescription decision-making and hypothesized that adolescents in racially concordant patient-physician pairs would be more likely to be prescribed an IUD, due to previous work that Black and White patients report greater satisfaction with their healthcare when they have a racially concordant physician.<sup>27</sup>

## **Methods**

### *Participants and Procedure*

From November 2014 to January 2015, 161 (21%) medical and nursing school students from a northeastern university completed an anonymous online survey on their attitudes about IUDs for adolescents. We sent the survey link in an email requesting participation to 763 students two times, 1.5 months apart, and approximately 185 students accessed the survey site and completed the consent form. In the emails, we informed the students they would be entered into a raffle for gift cards in exchange for their participation.

After completing the consent form, participants were provided with background information about IUDs, including their purpose, how they function, and some American College of Obstetricians and Gynecologists (ACOG) recommendations for using them. Participants were also provided three supporting and opposing claims of prescribing IUDs. The quotes conveyed facts about IUDs such as “Unlike birth control pills, which require that users remember to take them on a daily basis, IUDs need little to no maintenance” - Dr. Sara Pentlicky,<sup>28</sup> a gynecologist and family planning specialist at the University of Pennsylvania, and “For uninsured patients, IUDs cost several hundred dollars up front” - Dr. Jeffrey Peipert,<sup>29</sup> a professor of obstetrics and gynecology at Washington University of St. Louis. These quotes came primarily from physicians.

### *Study Manipulation*

Next, participants were presented a case vignette, which was adapted from a study of bias in providers' prescription of HIV pre-exposure prophylaxis<sup>30</sup> and modified with the assistance of medical students from different universities. The vignette described a clinical scenario in which an adolescent female patient requested an IUD; information about her frequency of sexual

intercourse and her inconsistent condom use behavior was also provided. The two primary study manipulations were race of the patient (Black vs. white) and number of sexual partners (one vs. multiple) (See Box 1). Vignette versions were identical except for the race of the patient (Black or White) and the number of partners of the patient (one or multiple). An automated randomization system assigned participants in a 1:1:1:1 ratio to one of the four versions of the vignette.

Then, participants reported their assessment and judgments on clinical measures of interest (e.g. perceived risk of pregnancy and HIV/STI, predicted sexual risk compensation, willingness to prescribe IUD) for the hypothetical patient, as well as their self-identified socio-demographic and health profession training characteristics. After they completed the survey, participants were debriefed and provided with a link to ACOG for more information about IUDs for sexually active adolescents. All study procedures were reviewed and approved by the Yale University Institutional Review Board prior to inception.

Box 1. Clinical Vignette presented to participants in the online survey

**The patient is a 15-year-old Black (White) female. She has come to you requesting an IUD, stating that she had heard about them from her friend. Assume that you have the medical training needed to insert the IUD.**

**She's been with her current boyfriend, who has been her only sexual partner, for the past year. (She has no current boyfriend, but has had several sexual partners over the past year.) She has sex about once a week. During previous appointments, you have discussed STI/HIV risk with her and encouraged her to use condoms. However, she does not always use them.**

**Her age at menarche was 13, and she has a regular menses. She has not been pregnant before and is not currently on birth control or any other regular medications. Lab tests confirm that she is not pregnant, does not have any STIs or serious medical or mental health issues. She is physically active and has no physical complaints. She has never had surgery or been hospitalized. She has no family history of reproductive tract disease or complications and no allergies.**

### *Socio-demographic and Medical Training Characteristics*

The survey collected information about the participants' race [re-coded as White versus not, because the number of non-White providers did not allow for further subdivision within racial/ethnic minority groups], gender [re-coded as male versus not], sexual orientation [re-coded as heterosexual versus not], age (years), social class [lower/ lower middle/ middle/ upper middle/ upper], school of attendance [re-coded as School of Medicine versus not], and current year of professional school [1st/ 2nd/ 3rd/ 4th/ other, with other excluded in analyses]. Participants' clinical experience with sexually active adolescents patients was also assessed by asking, "Have you interacted with sexually-active adolescent patients in a clinical setting in the past?" [(1) never to (4) often].

### *Clinical Judgments*

Based on the distribution of the outcome, each clinical judgment, which was collected as a continuous variable, was re-coded as a dichotomous variable.

Perceived Patient Risk of Getting Pregnant With and Without an IUD. Participants' judgment of the patient's risk of getting pregnant without an IUD was measured with the question, "How high do you think this patient's risk of getting pregnant is without an IUD?" [(1) extremely low to (5) extremely high]. In analysis, "High risk of getting pregnant without an IUD" was defined as a response of 4 (Fairly High) or 5 (Extremely High). Similarly, participants' judgment of the patient's risk of getting pregnant with an IUD was measured with the question, "How high do you think this patient's risk of getting pregnant is with an IUD?" [(1) extremely low to (5) extremely high]. "High risk of getting pregnant with an IUD" was defined as a response of 4 (Fairly High) or 5 (Extremely High).

Perceived Patient Risk of HIV/STI Infection. Participants' judgment of the patient's risk of acquiring HIV/STI without an IUD was measured with the question, "How high do you think this patient's risk of getting HIV/STI is WITHOUT an IUD??" [(1) extremely low to (5) extremely high]. In analysis, "High risk of getting HIV/STI without an IUD" was defined as a response of 3 (Moderate) or greater.

Predicted Patient Appropriateness for IUD. Participants' perception of the patient's appropriateness for an IUD was measured with the question, "How APPROPRIATE do you think it would be for you to prescribe an IUD to this patient??" [(1) not at all appropriate to (5) extremely appropriate]. In analysis, the measure of "Highly appropriate to prescribe" was defined as a response of 4 (Very Appropriate) or 5 (Extremely Appropriate).

Predicted Patient Sexual Risk Compensation. Participants' belief about the likelihood of the patient engaging in sexual risk compensation, more specifically having more sex or using condoms less often, if prescribed an IUD was measured with two questions: "How likely would this patient be to use condoms LESS if she received an IUD?" and "How likely would this patient be to have MORE sex if she received an IUD?" [for both questions: (1) not at all likely to (5) extremely likely]. In analysis, the measure "Patient likely to decrease condom use with IUD" was defined as a response of 3 (Somewhat Likely) or greater to its respective question. "Patient likely to have more sex with IUD" was defined as a response of 4 (Very Likely) or 5 (Extremely Likely) to its respective question.

Willingness to Prescribe IUD Participants. The willingness to prescribe an IUD to the patient described was measured with the question, “Would you prescribe an IUD to this patient?” [(1) definitely no to (5) definitely yes]. In analysis, the measure “Willing to Prescribe IUD” corresponded to a response of 4 (Probably Yes) or 5 (Definitely Yes).

### *Manipulation Check*

In order to assess if the participants noted the background characteristics of the patient in the clinical vignette that they were presented, participants were asked to choose the patient’s race [(1) American Indian or Alaska Native/ (2) Asian/ (3) Black or African American/ (4) Hispanic or Latino/ (5) Native Hawaiian or Pacific Islander/ (6) White/ (7) other/ (8) I don’t know] and number of sexual partners [(1) One, (2) More than One (3) I don’t Know]. These questions were at the end of the survey. 81% of participants accurately reported the number of partners (single vs. multiple) of the patient in the condition to which they were assigned and 68% accurately reported the race (Black or White) of the patient.

Applying the principles and methodology of intention-to-treat analysis,<sup>31</sup> we included every participant who was randomized in our study, regardless of the results of the manipulation check. Further, we noted that, consistent with a previous finding,<sup>30</sup> the majority of the participants that did not accurately report the race of the patient (reported “I don’t know”) were assigned the White-patient condition, which suggests that this finding might reflect a systematic difference between how participants are coding race between the two conditions. Previous scholarship has proposed that White is viewed as the “default” race in the United States,<sup>32</sup> and a cognitive bias toward the majority, “default” race might prevent participants from processing information about race for the White-condition as noteworthy (and thus are more likely to report

“I don’t know”). Including these participants in our analyses allowed us to capture this non-random cognitive bias.

### *Analysis*

We used SAS 9.3 to perform all statistical analyses. To test for differences in socio-demographic and health professional school training characteristics between both Black-patient and White-patient conditions and single-partner and multiple-partner conditions, we performed independent samples t tests (for continuous variables) and chi-square (for dichotomous variables). We recoded the primary outcomes, which were collected as continuous variables, as dichotomous variables based on the empirical data. We conducted regression analyses to examine the main and interaction effects of survey manipulations (patient race and number of partners) and provider race on clinical judgment outcomes, with and without adjusting for school of attendance and gender.

## **Results**

### *Sample Characteristics*

The 161 medical and nursing school students that completed the survey ranged in age from 21 to 55 years ( $M = 27.09$ ,  $SD = 4.64$ ) and were predominantly White females. Additional socio-demographic and health professional training characteristics are provided in Table 1.

Chi-square tests and independent samples t tests revealed no differences between Black-patient and White-patient conditions or between one partner and multiple partner conditions in terms of school, gender (male versus not), race (White versus not), social class, sexual orientation (heterosexual versus not), year of professional school, and past clinical experience

with sexually active adolescents ( $p > 0.05$ ). There was a statistically significant difference in age between the single partner and multiple partner conditions ( $p = 0.0106$ ): The single partner condition group was older ( $M = 28.06$ ,  $SD = 5.67$ ).

### *Between-Group Comparisons*

Table 2 displays frequencies and between-group differences for the primary variables of interest. A key finding was that there was no significant association between patient race and any of the outcomes. Significant differences by condition were related to perceived patient risk of getting pregnant without an IUD and perceived patient risk of HIV/STI infection without an IUD for the different number of sexual partner conditions. More specifically, providers predicted that the patient with multiple partners was more likely to be at high risk of getting pregnant without an IUD compared to the patient with only one partner ( $p = 0.028$ ), although the vignette explicitly controlled for the number of sexual encounters of the patient and condom use. The odds of predicted high risk of pregnancy without an IUD for adolescents with more than one partner was 4.379 times that for adolescents with only one sexual partner ( $p = 0.028$ ). Providers also predicted that the odds of HIV/STI acquisition for adolescents with more than one sexual partner was 16.936 times the odds of HIV/STI for adolescents with only one partner ( $p < 0.001$ ). Lastly, there was no significant association between the interaction of patient race and number of partners and any of the outcomes, with or without adjusting for school of attendance and gender. More specifically, the results show that all p-values for patient race and number of partners interactions are greater than 0.05.

### *Race of Provider Analyses*

We found that the interaction of patient and provider race was significant for “Willing to Prescribe IUD,” such that non-White providers were significantly less likely to prescribe to White adolescents than Black adolescents ( $p = 0.029$ ), while White providers displayed similarly high prescription behavior to both Black and White adolescents. Other findings include that White providers were significantly more likely to find it appropriate to prescribe an IUD to the sexually active adolescent, regardless of the patient’s race or number of sexual partners, compared to non-White providers ( $p = 0.003$ ). White providers were also significantly more likely to report that the sexually active adolescent, regardless of the patient’s race or number of sexual partners, would be at high risk of getting pregnant without an IUD ( $p = 0.039$ ). There was no significant interaction between provider race and partner race or number of partners for any of the other outcomes, and there was no significant three-way interaction between the patient race, provider race, and number of partners for any of the outcomes.

Table 1. Socio-demographic and descriptive characteristics of sample (n = 161)

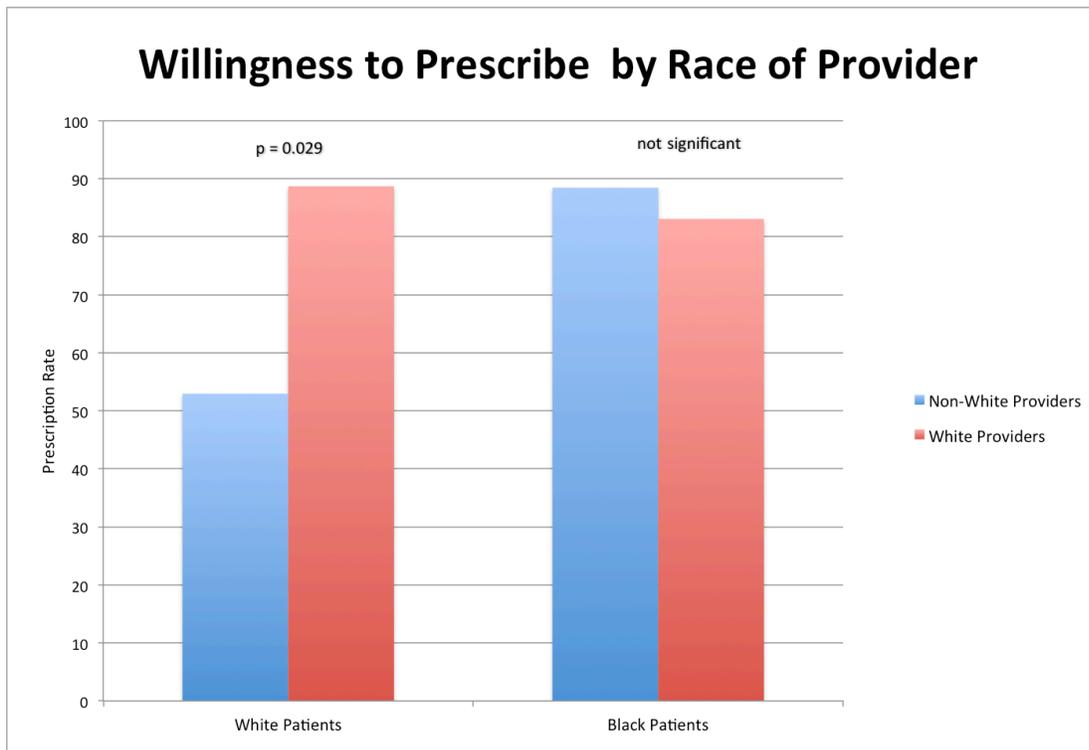
Characteristic	n (%)
Gender	
Female	132 (82.0)
Male	28 (17.4)
Transgender	1 (0.6)
School	
School of Medicine	60 (37.3)
School of Nursing	101 (62.7)
Race	
Asian	27 (16.8)
Black or African American	3 (1.9)
Hispanic or Latino	5 (3.1)
White	118 (73.3)
Other	8 (5.0)
Social Class	
Lower	7 (4.4)
Lower Middle	15 (9.4)
Middle	60 (37.5)
Upper Middle	71 (44.4)
Upper	7 (4.4)
Current Year of Health Professional School	
1st Year	56 (34.8)
2nd Year	45 (28.0)
3rd Year	35 (21.7)
4th Year	10 (6.2)
Other	15 (9.3)
Past clinical experience with sexually active adolescents	
Never	24 (14.9)
Rarely	36 (22.4)
Sometimes	53 (32.9)
Often	48 (29.8)

Table 2. Frequencies and Between-group differences for the Primary Variables

	Race of Patient		p-value	Number of Partners		p-value
	White (n=70)	Black (n= 91)		Single (n= 78)	Multiple (n=83)	
	% (n)	% (n)		% (n)	% (n)	
High risk of getting pregnant without IUD	90.0 (63)	92.3 (84)	0.6074	85.9 (67)	96.3 (80)	0.0280*
High risk of getting pregnant with IUD	1.4 (1)	0 (0)	0.9562	0 (0)	1.2 (1)	0.9601
High risk of getting HIV/STI without IUD	85.7 (60)	83.5 (76)	0.7029	70.5 (55)	97.6 (81)	0.0002*
Highly appropriate to prescribe	72.9 (51)	81.3 (74)	0.2035	83.3 (65)	72.3 (60)	0.0957
Patient likely to have more sex with IUD	11.4 (8)	9.9 (9)	0.7530	7.7 (6)	13.3 (11)	0.2565
Patient likely to decrease condom use with IUD	74.3 (52)	76.9 (70)	0.6987	76.9 (60)	74.7 (62)	0.7421
Willing to Prescribe IUD	80.0 (56)	84.6 (77)	0.4448	85.9 (67)	79.5 (66)	0.2883

\*p < 0.05

Figure 1. Willingness to Prescribe Rates by Race of Provider



## **Discussion**

In our study of provider bias surrounding the prescription of IUDs based on patient race and sexual history, our primary finding was that there did not seem to be overall bias toward the race of the patient. More specifically, medical and nursing students predicted that Black and White adolescents would have a comparable risk of pregnancy and HIV/STIs and demonstrate similar sexual behaviors with an IUD. The participants displayed a high willingness to prescribe IUDs to both Black and White adolescents, and an interaction between the race and number of partners and any of these outcomes was not observed. These findings are encouraging, as they might suggest that young health care providers exhibit less bias. However, as previous studies have found that the lack of provider knowledge about IUD safety and eligibility information serves as a barrier to IUD provision,<sup>33,34</sup> the high prescription rates to all adolescents in this study might primarily reflect that these providers are very knowledgeable about IUDs, especially since IUD background and eligibility information was provided in our study. More specifically, the inclusion of this information might have reduced the medical and nursing students' uncertainty and potential discomfort about prescribing IUDs to certain sexually active adolescents, which might be present in currently practicing providers who are not informed of or do not trust ACOG's recommendations. Further, given the low rates of IUD provision and the differences in prescription rates by race with current providers,<sup>20</sup> our finding also might indicate that experiences that happen during practice, ones that many medical and nursing students have yet to experience, contribute to provider bias, which might explain why students exhibit less bias. Nevertheless, the implications of this finding include the potential to reduce racial differences in IUD prescription rates by educating providers about IUD background and ACOG eligibility information.

In contrast to previous findings,<sup>23, 25</sup> the prescription rates did not significantly vary between patients with single and multiple sexual partners in our study. Another key finding was that medical and nursing students predicted that the adolescent patient with multiple partners was more likely to be at high risk of getting pregnant without an IUD compared to the patient with one partner. The providers also predicted that the odds of HIV/STI for adolescents with more than one sexual partner was 16.936 times the odds of HIV/STI for adolescents with only one partner.

More than a quarter of teenagers in the United States report having had more than one sexual partner in their life time,<sup>35</sup> with about 15% of high school students consistently reporting having four or more sexual partners during their life.<sup>36</sup> Consequently, it is clear that many adolescent patients that seek contraception might have multiple partners. Having more than one sexual partner places the patient at increased risk for STIs, including HIV.<sup>37</sup> This is consistent with our participants' prediction that the odds of HIV/STI for adolescents with more than one sexual partner were greater than the odds of HIV/STI for adolescents with only one partner. However, while a patient's number of sexual partners is clinically relevant to the patient's sexual health, this information might also be used to stereotype patients. For example, although studies have provided inconsistent findings on whether there is an association between an individual's number of sexual partners and condoms use,<sup>38-41</sup> with a recent review finding that among adolescents with long-acting reversible contraception (i.e. IUDs and implants), those with multiple partners report a higher use of condoms,<sup>42</sup> assumptions about those with multiple partners being less reliable users of condoms might be most present. This could explain why more medical and nursing students predicted that the adolescent patient with multiple partners was more likely to be at high risk of getting pregnant without an IUD compared to the patient

with only one partner, even though we explicitly controlled for the condom use and frequency of sexual encounters of the patient. The description of the patient's condom use (i.e. *she doesn't consistently use them*), though representative of the typical condom use behavior for adolescents,<sup>19</sup> left room for interpretation, and the interpretation may have been influenced by stereotypes. In other words, these healthcare providers may have assumed that, prior to receiving an IUD, adolescents with multiple partners would demonstrate less consistent condom use compared to adolescents with a single partner.

Although the prescription rates did not vary between single and multiple partner conditions in this sample, these findings suggest that the patient's number of sexual partners might affect the IUD prescription decision-making process for other providers, particularly as they make assumptions about her other sexual risk behaviors. This is further supported by previous findings that providers were less likely to prescribe IUDs to women that are not in monogamous relationships.<sup>23, 25</sup> Consequently, it is important that providers continue to be reminded that ACOG currently states that it is appropriate for women with high risk of STIs (which includes women both under the age of 25 and with multiple partners) to be screened for STIs and placed with IUD on the same day the test results are available.<sup>24</sup>

We also found the provider's race (White or non-White) to be significantly associated with several of the measures, including the likelihood to prescribe an IUD for an interaction effect with the patient's race. More specifically, we found that non-White medical and nursing students were significantly less likely to prescribe to White adolescents than Black adolescents, while White students were likely to prescribe IUDs to both adolescents. White medical and nursing students were also significantly more likely to find it appropriate to prescribe an IUD to the sexually active adolescent, regardless of the patient's race or number of sexual partners,

compared to non-White providers. Lastly, the White providers were significantly more likely to report that the adolescent, regardless of her race or number of sexual partners, would be at high risk of getting pregnant without an IUD.

The finding that White providers were similarly likely to prescribe to White and Black adolescents whereas non-White providers were less likely to prescribe IUDs to White versus Black adolescents was unexpected. Given the results that White medical and nursing students were more likely to report that the patient would be at high risk of getting pregnant without an IUD and to find it appropriate to prescribe an IUD, we would expect that the White providers would be more likely to prescribe IUDs to all patients compared to the non-White providers. However, we found this to only be the case for White patients, as a similar high proportion of White and non-White providers indicated a willingness to prescribe to Black patients. Consequently, this finding could be interpreted as non-White providers over-prescribing to Black adolescents within one perspective, or, more generally, as non-White providers under-prescribing to White adolescents. Nevertheless, these conclusions must be interpreted cautiously as more information is needed to assess or understand the bias present. Previous research has suggested that racial concordance between provider and patient might be important in sexual health decision-making,<sup>43-45</sup> but the specific mechanism behind the observed association in this study is unclear, especially since the non-White providers were an ethnically diverse group that was primarily non-Black. However, it is encouraging that prescription willingness for Black and White patients did not differ among the White medical and nursing students, as this could potentially reduce the disparities in IUD provision and other reproductive health outcomes by race in the future.

Lastly, it is important to note general trends in this sample. For example, we observed high-anticipated sexual risk compensation across all conditions in terms of condoms but low in terms of sexual encounters. This could be explained by the extensive research and focus on condom use in adolescents,<sup>13, 41, 46, 47</sup> and the current findings that the prevalence of dual method use (i.e. condom use with other forms of contraception) is generally low among adolescents and young women,<sup>47</sup> while information on the frequency of sexual activity among adolescents is more lacking. In a study of the motivations underlying adolescents' decisions to use dual methods, concerns about pregnancy and STIs and the type of sexual partner (main versus casual) were found to influence condom use.<sup>13</sup> For example, adolescents that used hormonal contraceptives (which includes one of the common types of IUDs) were significantly less likely to use condoms with their main partners than those that did not use hormonal contraceptives, but there was no association between condom and contraceptive use for casual partners. Further, among adolescents that perceived pregnancy as more negative, those that used hormonal contraceptives were less likely to also use condoms; similarly, among those that perceived themselves at low risk of acquiring STIs, those that used hormonal contraceptives were less likely to use condoms. These findings provide evidence that hormonal contraceptive use could be correlated with decreased condom use in some adolescents, as predicted by the medical and nursing students in our study. However, despite the anticipated sexual risk compensation, promotion of the dual method use, especially with effective contraceptive methods, continues to be the most effective tool to reducing the prevalence of unintended pregnancy and HIV/STIs among adolescents and young adults.<sup>47</sup>

Limitations of the current study include the use of medical and nursing students, which might reduce the ability to generalize our findings to the prescription behaviors of current

independently practicing healthcare providers. For example, due to different system, provider and patient-related factors, the relatively high prescription rates in this sample might not be attainable or realistic for current providers. However, we focused on medical and nursing students because many of them are just entering their careers providing care and represent the future of care provided. Further, with their current limited clinical experiences, medical and nursing students might be less influenced by biases that occur as a result of daily clinical practice; understanding the factors that might influence their decision-making, prior to this potential bias, is valuable in designing sexual health education and prevention programs to be integrated in health professional training.

The use of clinical vignettes also limits the extent to which our findings can predict, or be applied to, the prescription behaviors of current healthcare providers in real-world settings. Further, as our vignette included an adolescent seeking an IUD, we did not assess whether providers would recommend IUDs to adolescents that are not seeking an IUD or are less informed about contraceptive care, which might be a more common scenario. IUD recommendations in these cases might be more apt to be influenced by provider bias, as previous research has found that providers are more likely to exhibit racial discrimination in situations and decision-making processes that are more ambiguous<sup>48</sup> (e.g. such as in scenarios in which the patient was uninformed about different contraceptive methods or did not have a preference). In our vignette, we also did not provide information about the patient's ability to financially afford an IUD or her socioeconomic status, which has previously been found to have a significant interaction with patient race for IUD recommendations.<sup>12</sup> The cost of IUDs can serve as a barrier for many women and adolescents, especially those that are uninsured or underinsured,<sup>49</sup> and might be an important factor for practicing health care providers to consider. It is unclear if our

participants accounted for this factor in their decision-making and how this might have affected our results. Nevertheless, despite these vignette-specific limitations, we used clinical vignettes in our study, because they are generally considered a valid method of assessing clinical decision-making specifically based on patient socio-demographic characteristics.<sup>50</sup>

The sample size in our study also served as a limitation, as it did not allow for further subdivision within racial/ethnic minority groups or for an assessment of racial concordance in the physician-patient pairs in the different race conditions. Given our findings of the significant interaction between provider and patient race, with non-White providers being less likely to prescribe to White adolescents compared to Black adolescents, it is important to perform separate analyses within participant racial minority groups to better understand this interaction.

Finally, although there was no significant association between race of the adolescent and any of the outcomes in this study, which suggests that there might be limited racial bias present in this sample of medical and nursing students or regarding adolescents more broadly, these findings must be interpreted cautiously in light of previous findings of racial bias in older health care professionals and the differences in current prescription rates.<sup>12</sup>

Our results suggest that providers of contraception and policy makers should be aware of the potential effect of patient and provider socio-demographic characteristics on contraceptive recommendations. For example, as we build on previous research that has found health providers less willing to prescribe IUDs in non-monogamous relationships,<sup>23, 25</sup> our study suggests that providers might be making assumptions about adolescents with multiple partners that could serve as barriers to IUD provision; these should continue to be specifically addressed by educating providers about ACOG eligibility information and recommendations. Our results also draw attention to the need to understand how the background characteristics of providers, as well as

patients, influences the care provided. Future research could examine the extent to which providers' characteristics contribute to differences in contraception access and utilization, as well as determine what types of interventions might alleviate differences in prescription habits and assumptions about patients. Further enhancing provider awareness of their role in stereotyping and emphasizing patient-centered care might contribute to decreasing health care disparities.<sup>12, 51.</sup>

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