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# Differences in Contraceptive Discontinuation Among Black and White Women: Evidence from the Contraceptive CHOICE Project

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## Abstract

**Objective:** We sought to evaluate whether differences in rates of contraceptive discontinuation exist among black and white women receiving contraceptive counseling and no-cost contraception among users of long-acting reversible contraceptive (LARC; intrauterine devices or subdermal implant) and non-LARC (oral contraceptive pills, contraceptive vaginal ring, patch, or injection) methods.

**Materials and Methods:** We analyzed data from a prospective cohort study of 7546 non-Hispanic black and white women who participated in the Contraceptive CHOICE Project. Among women who initiated their method within 12 weeks of enrollment, discontinuation was defined as any break in use longer than 1 month. Using Cox proportional hazards regression analysis, we estimated discontinuation stratified by use of LARC methods.

**Results:** There were no statistically significant differences in contraceptive discontinuation between black and white women at 12, 24, or 36 months among both LARC [12-month adjusted hazard ratio ( $HR_{adj-12M}$ ) 1.01 (95% confidence interval or 95% CI 0.86–1.18);  $HR_{adj-24M}$  1.10 (95% CI 0.97–1.24); and  $HR_{adj-36M}$  1.10 (95% CI 0.98–1.23)] and non-LARC users [ $HR_{adj-12M}$  1.08 (95% CI 0.92, 1.26);  $HR_{adj-24M}$  1.07 (95% CI 0.94, 1.23); and  $HR_{adj-36M}$  1.08 (95% CI 0.95, 1.23)] adjusting for confounders. Secondary analyses found no significant differences in discontinuation of LARC and non-LARC methods among black and white women at highest risk of pregnancy or those receiving public assistance at baseline.

**Conclusions:** At 12, 24, and 36 months there were no differences in contraceptive discontinuation of both LARC methods and non-LARC methods when comparing white and black women.

**Keywords:** race, long-acting reversible contraception, family planning, discontinuation

## Introduction

UNINTENDED PREGNANCY RESULTS in long-term adverse economic, health, and social consequences for society, women, and their families.<sup>1–3</sup> Despite this, almost half of pregnancies in the United States annually are unintended.<sup>4,5</sup> While the percentage of unintended pregnancies has decreased among both white and black women between 2008 and 2011 (from 42% to 38% and from 69% to 64%, respectively), it is far higher among black women (64%).<sup>5,6</sup> Black women have unintended live birth rates twice that of white women (37% vs. 18%).<sup>7</sup> Use of the most effective methods of contraception, particularly long-acting reversible contraceptive

(LARC) methods like intrauterine devices and subdermal implants, may dramatically reduce both the rate of unintended pregnancy and its economic burden,<sup>8,9</sup> yet significant barriers to use of the most-effective contraceptive methods persist.<sup>10</sup>

Prior studies have documented clear differences in the contraceptive methods used by black and white women. Data from the 1995 and 2006–2010 waves of the National Survey of Family Growth (NSFG) found that while no differences in use of highly effective contraceptives among black and white women were evident in 1995, a significantly lower percent of black women than white women were using highly effective contraception in 2006–2010.<sup>11</sup> Dehlendorf extended this

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evaluation of 2006–2010 NSFG data and ascertained that black women had lower use of both moderately and highly effective contraceptive methods compared with their white counterparts.<sup>12</sup> Differences in contraceptive use have been observed in settings designed to minimize barriers to effective contraceptive use; the California Family Planning, Access, Care, Treatment (PACT) program, which provides free family planning services to low-income women, found that black women were less likely to receive intrauterine devices and more likely to receive injectable contraception, barrier methods, and emergency contraception than white women.<sup>13</sup>

Barriers to continuation of contraception include cost, access to clinical care, and availability of pharmacy services. The Contraceptive CHOICE Project sought to reduce barriers to contraceptive use primarily *via* access to no-cost contraception, but also *via* access to ongoing clinical care and support and pharmacy services. Previous CHOICE analyses have documented that black women were as likely as white women to choose the most effective methods of contraception in this setting,<sup>14,15</sup> but it is not clear whether these methods were continued long term. Prior analyses of racial differences in contraceptive discontinuation have been mixed; most, but not all, have found higher rates of discontinuation among black women.<sup>16–23</sup> We hypothesized that previously observed differences in contraceptive discontinuation were attributable to barriers to care and service that differentially affect black women. In this analysis, we examined whether there were significant differences in discontinuation between black and white women stratified by use of long- and short-acting contraceptive methods which have different barriers to continuation.

## Materials and Methods

The Contraceptive CHOICE Project was a prospective cohort study of contraceptive selection and discontinuation that enrolled 9256 St. Louis area women between August 2007 and September 2011. A summary of CHOICE methods is provided below, and a more detailed description is published elsewhere.<sup>24,25</sup> In brief, CHOICE provided each participant with contraceptive counseling and their choice of contraception for the duration of their study participation (2–3 years); this included no cost for refills, injections, or device removal. The counseling used a structured model that included information on all reversible Food and Drug Administration-approved contraceptive methods and highlighted the issue of contraceptive effectiveness or the number of pregnancies prevented among 100 typical users in 1 year.<sup>26</sup> Counseling was provided at the initial study visit before the selection of contraceptive method.

Participants were women between the ages 14 and 45 years who wanted to delay pregnancy<sup>27–29</sup> for 1 year or longer at enrollment. Women who were not at risk for pregnancy (history of hysterectomy or tubal ligation), not sexually active, or not interested in reversible contraception were excluded. At enrollment participants completed a detailed intake interview, received contraceptive counseling, had a clinical assessment with a CHOICE-affiliated provider, and received the contraceptive method of their choice (or appropriate bridge method for women not eligible for immediate start). Follow-up interviews included questions on contraceptive use, discontinuation and satisfaction, and reproductive outcomes.

Contraceptive continuation was defined as continuous use of the chosen LARC or non-LARC method at 12, 24, and 36 months among women who started their contraceptive method within 3 months of enrollment. LARC methods included the levonorgestrel intrauterine system, the copper intrauterine contraceptive, and the etonogestrel subdermal implant. Non-LARC methods included oral contraceptive pills, vaginal ring, contraceptive patch, and depot medroxyprogesterone acetate injection. Given that the recommended duration of use of the etonogestrel implant was 36 months from the date of insertion, all observations were censored at 36 months. Discontinuation was defined as any stop of 1 month or longer and was determined primarily by self-report assessed *via* telephone follow-up at 3 months and then every 6 months starting at 6 months. Method use information was supplemented by pharmacy refill logs and study clinic data that tracked device removals or expulsions.<sup>28</sup> Participants that became pregnant or were lost to follow-up were censored at the time of pregnancy and last observation, respectively. Of the 8419 participants with discontinuation data, we excluded 654 women who reported a race other than African American or black or Caucasian/white and 219 Hispanic women. The final analytic sample included 7546 women which represented 82% of the CHOICE cohort and 90% of participants with discontinuation data.

Analyses included chi-square and Wilcoxon rank-sum tests to evaluate racial differences in LARC use and other important covariates (Table 1). Potential confounders included age, highest level of education, self-reported monthly income, insurance (none, private, or public), current receipt of public assistance, trouble paying for basic necessities, parity, history of unintended pregnancy, sexually transmitted infection (STI) at time of enrollment, told by healthcare provider that had an STI, and number of sexual partners (lifetime). Other variables evaluated, but found to not be confounding, included enrollment site, body mass index, gravidity, history of abortion, age of menarche, age of first sex, number of sexual partners in the past month, and tobacco use (data not shown). Eleven recruitment sites were included in adjusted analyses; however, sites with small enrollments were collapsed in Table 1 to protect confidentiality. Confounding was assessed for association with black race using logistic regression and for association with time to contraceptive discontinuation using Cox proportional hazards regression stratified by LARC use.

We estimated the proportion of participants who discontinued within 36 months of contraceptive initiation through the construction of Kaplan–Meier survival curves. Given that the barriers differ for LARC and non-LARC methods, analyses of racial differences were stratified by LARC use. We also estimated the discontinuation rate per 100 woman years using the Stata function, *stptime*, based on the approach described by Clayton and Hills.<sup>30</sup> Crude and adjusted hazard rate ratios were estimated for the association of black race with contraceptive discontinuation stratified by contraceptive method duration of effectiveness using Cox proportional hazards regression. Variables significantly associated with both race and discontinuation ( $\alpha \leq 0.05$ ) and study enrollment site were included in adjusted Cox proportional hazards regression models (Table 2).

Due to the potential influence of residual confounding by socioeconomic status and of unmeasured confounders on our

TABLE 1. SOCIODEMOGRAPHIC, SEXUAL, AND HEALTH CHARACTERISTICS AT ENROLLMENT OF NON-HISPANIC BLACK AND WHITE WOMEN IN THE CONTRACEPTIVE CHOICE PROJECT BY INITIAL CONTRACEPTIVE METHOD AND RACE, N=7546

	Non-LARC methods		p	LARC methods		p
	White	Black		White	Black	
	N=901	N=1157		N=2500	N=2988	
Age (years)	N (col%)	N (col%)		N (col%)	N (col%)	
14–19	119 (13)	224 (19)	<0.001	240 (10)	542 (18)	<0.001
20–24	440 (49)	444 (38)		914 (37)	1040 (35)	
25–29	244 (27)	290 (25)		797 (32)	712 (24)	
30 and older	98 (11)	199 (17)		549 (22)	694 (23)	
Education						
≤High school	178 (20)	452 (39)	<0.001	636 (25)	1240 (42)	<0.001
Some college	369 (41)	536 (46)		932 (37)	1404 (47)	
College degree or more	353 (39)	169 (15)		931 (37)	343 (11)	
Public assistance <sup>a</sup>						
No	815 (90)	684 (59)	<0.001	1998 (80)	1308 (44)	<0.001
Yes	86 (10)	471 (41)		500 (20)	1678 (56)	
Insurance						
Not reported	9 (1)	16 (1)	<0.001	5 (<1)	26 (1)	<0.001
None	335 (37)	628 (54)		877 (35)	1186 (40)	
Private	529 (59)	384 (33)		1430 (57)	960 (32)	
Public	28 (3)	129 (11)		188 (8)	816 (27)	
Parity						
0	726 (81)	579 (50)	<0.001	1475 (59)	825 (28)	<0.001
1	107 (12)	310 (27)		489 (20)	948 (32)	
2	47 (5)	164 (14)		383 (15)	699 (23)	
3 or more	21 (2)	104 (9)		153 (6)	516 (17)	
Number of unintended pregnancies						
0	575 (63)	401 (34)	<0.001	1155 (46)	625 (21)	<0.001
1	198 (23)	346 (30)		640 (26)	826 (28)	
2	71 (8)	198 (17)		345 (14)	649 (22)	
3 or more	56 (6)	209 (18)		357 (14)	883 (30)	
Sexual partners in a lifetime						
0–3	271 (31)	328 (29)	<0.001	629 (25)	789 (27)	<0.001
4–5	139 (16)	269 (24)		384 (16)	748 (25)	
6–7	113 (13)	177 (15)		312 (13)	431 (15)	
8–12	164 (19)	211 (18)		536 (22)	553 (19)	
>12	182 (21)	158 (14)		609 (25)	437 (15)	
History of STI <sup>b</sup>						
No	693 (77)	572 (49)	<0.001	1767 (71)	1409 (47)	<0.001
Yes	207 (23)	585 (51)		733 (29)	1577 (53)	
Current STI <sup>c</sup>						
No	839 (98)	937 (87)	<0.001	2395 (98)	2462 (88)	<0.001
Yes	16 (2)	143 (13)		55 (2)	329 (12)	
Enrollment site						
University clinic	780 (87)	864 (75)	<0.001	1892 (76)	2038 (68)	<0.001
Community partner 1 (2 sites)	83 (9)	190 (16)		384 (15)	604 (20)	
Community partner 2 (4 sites)	14 (2)	34 (3)		161 (6)	133 (4)	
Community partner 3	13 (1)	28 (2)		37 (1)	108 (4)	
Community partner 4	5 (1)	12 (1)		16 (1)	65 (2)	
Community partner 5	6 (1)	29 (3)		10 (<1)	40 (1)	

<sup>a</sup>Receipt of public assistance: unemployment; temporary assistance for needy families; income-based supplemental nutrition assistance; or supplemental nutrition assistance for women, infants, and children.

<sup>b</sup>History of STI: Ever told by a healthcare provider that had one of the following STIs: chlamydia, gonorrhea, trichomoniasis, syphilis, human papillomavirus or genital warts, human immunodeficiency virus, or herpes.

<sup>c</sup>Current STI: *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, or *Trichomonas vaginalis*.

LARC, long-acting reversible contraceptive; STI, sexually transmitted infection.

TABLE 2. CRUDE AND ADJUSTED HAZARD RATE RATIOS FOR CONTRACEPTIVE DISCONTINUATION COMPARING BLACK AND WHITE WOMEN IN THE CONTRACEPTIVE CHOICE PROJECT

	<i>LARC methods</i>		<i>Non-LARC methods</i>	
	<i>Crude HRR (95% CI)</i>	<i>Adjusted<sup>a</sup> HRR (95% CI)</i>	<i>Crude HRR (95% CI)</i>	<i>Adjusted<sup>a</sup> HRR (95% CI)</i>
12 months	1.13 (0.98–1.30)	1.01 (0.86–1.18)	1.20 (1.05–1.38)	1.08 (0.92–1.26)
24 months	1.21 (1.08–1.34)	1.10 (0.97–1.24)	1.17 (1.04–1.31)	1.07 (0.94–1.23)
36 months	1.22 (1.11–1.35)	1.10 (0.98–1.23)	1.17 (1.05–1.31)	1.08 (0.95–1.23)

Compared to a reference group of White non-Hispanic women.

<sup>a</sup>Adjusted for age group, education, current receipt of public assistance, insurance, history of STI, and site of enrollment. 95% CI, 95% confidence interval; HRR, hazard rate ratios.

findings, we performed secondary stratified analyses across three variables as follows: receipt of public assistance, insurance status (uninsured, private, or public), and estimated risk for unintended pregnancy. Stratified Kaplan–Meier curves comparing black and white discontinuation were estimated by LARC use and compared using log-rank tests. Unintended pregnancy risk was estimated using a propensity score technique.<sup>31</sup> Specifically, we calculated the estimated risk of history of abortion, a proxy measure of unintended pregnancy, using a logistic regression technique with history of abortion as the outcome and potential confounders described in Table 1 and the number of unintended pregnancies as dependent variables. The estimated probability of unintended pregnancy ending in abortion was categorized as low risk ( $\leq$  median of 22.3%) or high risk.

While the current analyses were secondary and based on previously collected data, we estimated power for a non-inferiority study to test our hypothesis that discontinuation did not differ among black women. Our power calculations assumed a noninferiority margin of 0.15, a true estimate of effect of 1.1, and an  $\alpha$  of 0.05.<sup>32</sup> Based on these assumptions and available data, the current analyses had 74% (non-LARC) to 98% (LARC) power. All statistical analyses were completed using Stata (version 13; StataCorp LP, College Station, TX).

## Results

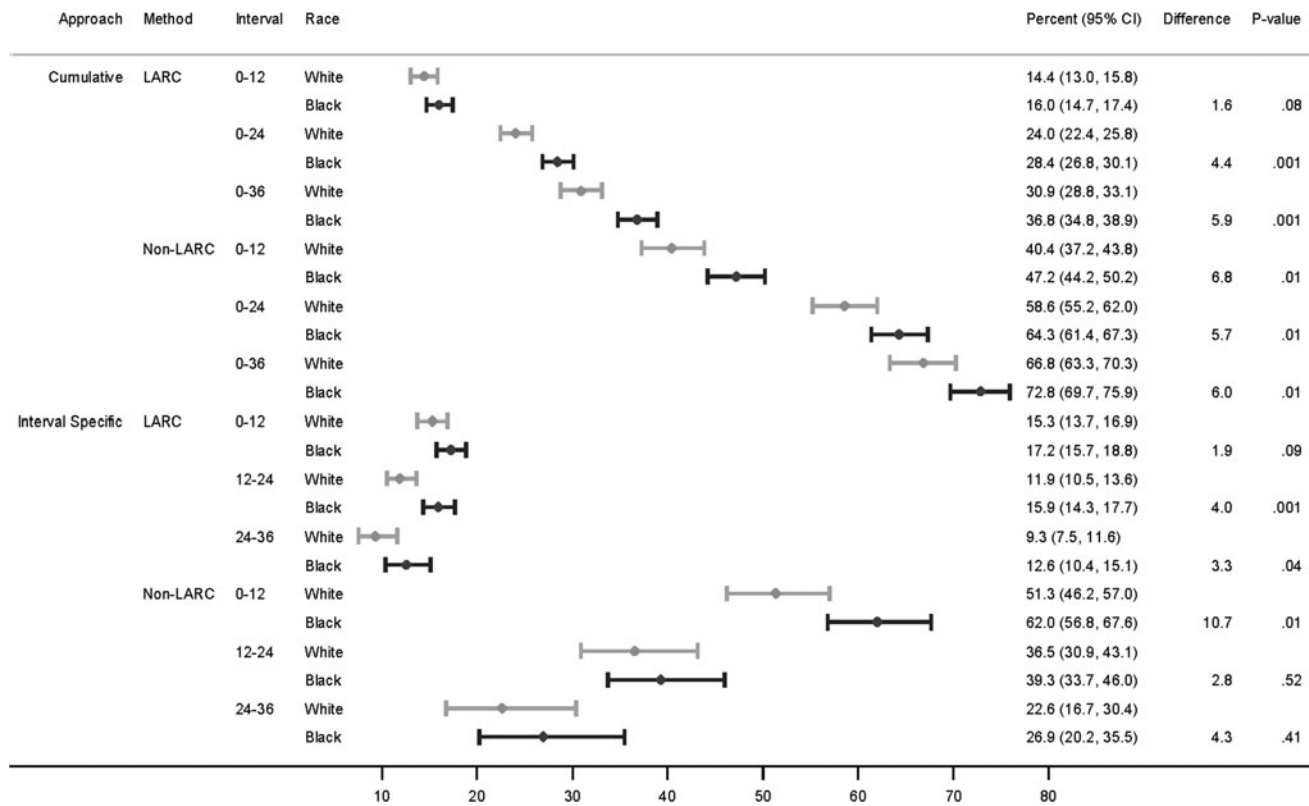
This analysis of 7546 CHOICE participants included 3401 non-Hispanic white (45%) and 4145 non-Hispanic black women (55%). Selection of LARC methods was comparable in both groups (73.5% and 72.1%,  $p=0.17$ ), but black participants had a higher rate of history of LARC use at enrollment (5.2% vs. 3.7%,  $p=0.002$ ). There were significant differences in sociodemographic, sexual, and health characteristics between white and black participants (Table 1). In both the LARC and non-LARC groups, black women were younger, more likely to only have a high school education or less, more likely to have lower income or report financial difficulty (public assistance or trouble paying for basic necessities), and were more likely to be uninsured or on public insurance compared to white women. Moreover, black women reported higher rates of reproductive outcomes (pregnancy, live birth, unintended pregnancy, and abortion) and current and past STI and earlier age at first sexual intercourse. Black women reported fewer lifetime sexual partners than white women, and there was no significant difference in the median number of sexual partners in the past month reported by black and white women.

Differences in the percent of black and white women who discontinued were lower among LARC users ranging from 1.6% to 5.9% and increased with increasing duration of use (Fig. 1). Differences in the percent discontinued among black and white non-LARC users ranged from 5.7% to 6.8% and did not display evidence of a temporal trend. Discontinuation was highest in the first year of use for both black and white women when examined in discrete annual intervals (0–12 months, 12–24 months, and 24–36 months). While discontinuation rates were modestly higher among black women for all methods and time intervals, the confidence intervals overlapped for all comparisons among black and white except for LARC discontinuation between 12 and 24 months.

While black women using LARC and non-LARC methods had higher rates of contraceptive discontinuation at 36 months in unadjusted analyses (Table 2), there were no clinically meaningful or statistically significant differences between adjusted rates of discontinuation for LARC and non-LARC methods for black women compared to white women. In Cox proportional hazards regression models adjusting for age, education, receipt of public assistance, insurance, history of STI, and enrollment site, discontinuation rates among black women were higher, but not significantly so, at all three time points (12, 24, and 36 months) for both LARC and non-LARC methods (Fig. 2). Findings at 24 and 36 months were within the noninferiority margin indicating no difference in discontinuation between black and white women.

Due to the potential influence of unmeasured confounding by factors relating to underlying risk of unintended pregnancy, we also performed a propensity score-based stratified analysis and compared differences in contraceptive discontinuation among black and white women with a median or less risk of pregnancy to those with greater than median risk of pregnancy. The overall median estimated probability of pregnancy was 22.3%. Among women with a greater than median risk, there were no significant differences among black and white in discontinuation among women with the highest risk of pregnancy [LARC: hazard ratio (HR) 1.11, 95% confidence interval (95% CI) 0.95–1.8 and non-LARC: HR 1.17, 95% CI 0.97–1.43].

Finally, black participants were more likely to have lower socioeconomic position. We performed analyses stratified by receipt of public assistance and insurance status to examine whether differences existed among black and white economically vulnerable women in the cohort. Discontinuation rates at 36 months among black women who selected a non-LARC method did not differ from their white peers who reported public assistance at baseline among both LARC [HR<sub>adj-assistance</sub> 1.15, 95% CI (0.94–1.41); HR<sub>adj-no assistance</sub>

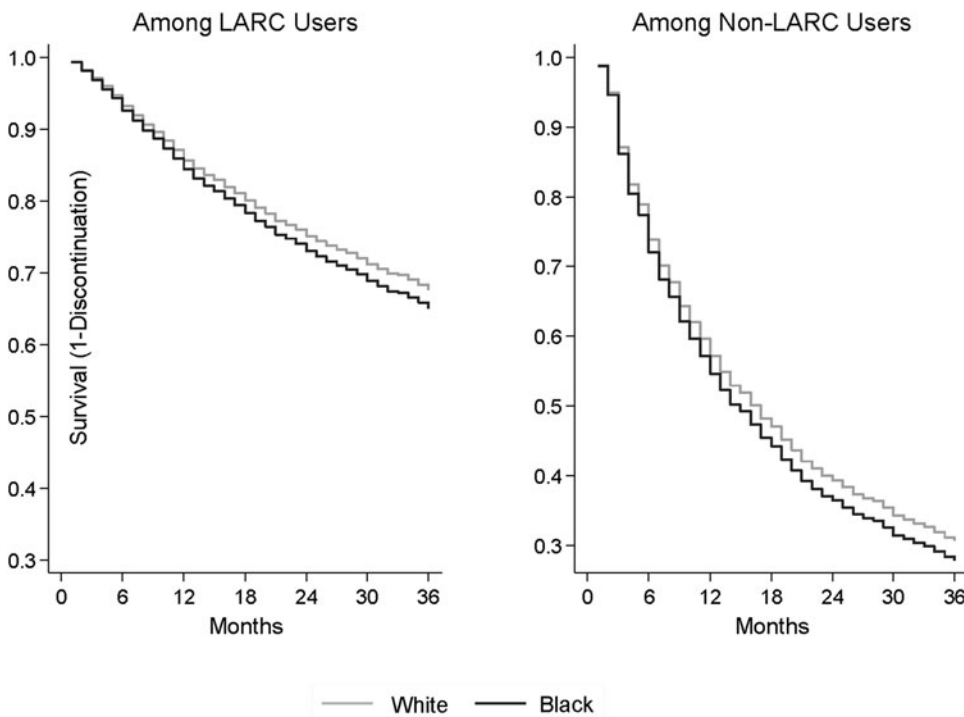


**FIG. 1.** Discontinuation of selected contraceptive method at 12, 24, and 36 months by long-acting reversible method and race. *p*-value estimated via log-rank test. 95% CI, 95%, confidence interval; LARC, long-acting reversible contraceptive.

1.06, 95% CI (0.92–1.23)] and non-LARC users [HR<sub>adj-assistance</sub> 1.14, 95% CI (0.83–1.56); HR<sub>adj-no assistance</sub> 1.07, 95% CI (0.92–1.23)] after adjusting for age, education, insurance status, history of STI, and study enrollment site. Of note, there were no significant differences in discontinuation rates comparing black to white women stratified by insurance status.

**Discussion**

This analysis found similar rates of contraceptive discontinuation among black and white women enrolled in the Contraceptive CHOICE Project. After adjustment for potential confounders, there were no statistically significant



**FIG. 2.** Survival curves over 36 months for contraceptive discontinuation comparing black and white women in the Contraceptive CHOICE Project.

differences in rates of discontinuation among both LARC and non-LARC users at 12, 24, and 36 months. Moreover, the stratified analyses detected no significant differences among many subgroups at traditionally high risk, including black and white women with the highest risk of unintended pregnancy and those receiving public assistance.

Relatively few studies have examined the association of race on contraceptive discontinuation for black and white women. A recent retrospective cohort study of intrauterine device users examined discontinuation over a period of 5 years and found that black women had higher rates of discontinuation than white women in adjusted analyses (HR 1.31, 95% CI 1.03–1.67).<sup>17</sup> A small study of discontinuation of the copper intrauterine device found that while black women had rates of 6 months discontinuation 2.3 times higher than non-black, non-Hispanic participants, this difference was not statistically significant.<sup>23</sup> A study of levonorgestrel intrauterine system users examined discontinuation among patients seen and not seen for follow-up at an academic clinic in an urban medical center. Among women not seen for follow-up, the rate of discontinuation among black women was higher, but not statistically different from that of white women (HR 1.30, 95% CI 0.93–1.82). Among patients that were seen, black women had rates lower, but again not statistically different from those of white women (HR 0.66, 95% CI 0.36–1.18).<sup>33</sup> Finally, an examination of 24 months contraceptive discontinuation data from CHOICE participants found a modest difference in discontinuation rates for black women compared to white, but did not stratify by use of LARC methods, which have markedly lower discontinuation rates.<sup>15,27</sup>

Multiple studies of non-LARC methods have found significantly higher rates of discontinuation among black women,<sup>20–22</sup> but not all,<sup>16</sup> and there is some evidence that black women may be more likely to discontinue pill use due to dissatisfaction than white women.<sup>34</sup> An early analysis of data from CHOICE examined differences in the 12-month discontinuation rates by race among 1452 users of oral contraception (OC), patch, or ring and found that black women were more likely to discontinue their method than white women (HR 1.21, 95% CI 1.02–1.44) after adjustment for marital status, receipt of public assistance, and prior use of the method.<sup>20</sup> However, this previous analysis included a lower risk cohort,<sup>25</sup> incomplete outcome ascertainment for the hardest to reach participants, and included black Hispanic and white Hispanic women in the comparisons. In a study comparing text reminders as a support for OC continuation, black women were twice as likely as white women to discontinue use by 6 months after adjusting for intervention, age, age of first intercourse, history of pregnancy, and prior use of OCs.<sup>21</sup> Similarly, black adolescents may have higher rates of discontinuation of injectable methods,<sup>22</sup> but findings are not consistent across studies.<sup>35</sup> In contrast, similar to our findings, Raine examined non-LARC method discontinuation in a cohort of young women (ages 15–24 years) and did not find a significant increase in risk of discontinuation at 12 months for black women, compared to white.<sup>16</sup>

The potential influence of attitudes about contraception and concern about side effects on discontinuation in an environment with contraceptive counseling and minimal barriers to method selection and continuation has not been established. Black and white women have similar attitudes regarding preventing unintended pregnancy.<sup>36,37</sup> Yet, key differences have been documented in “pregnancy fatalism”—the

belief that the use of birth control does not matter and “when it is your time to get pregnant, it will happen.”<sup>38</sup> Furthermore, experiences of side effects during use may also differentially impact discontinuation. Guzzo and Hayford<sup>38</sup> found that black women were significantly more concerned about potential side effects of contraceptive methods, including reduced sexual desire and serious health problems, while Callegari et al.<sup>37</sup> found that black women have more concerns about using contraception with hormones, effectiveness in preventing STI, and that a contraceptive method does not interrupt sex.

Key barriers to LARC use have been identified as cost, provider related (continuing education on method safety and eligibility, device-specific training, work setting), and resource related (availability of contraceptive counseling and devices)<sup>39,40</sup>; while barriers for non-LARC methods include insurance coverage, cost, difficulty obtaining or refilling prescriptions, challenges getting an appointment or getting to a clinic, and required physical examination.<sup>41</sup> CHOICE strove to minimize barriers to contraceptive continuation through a number of mechanisms: no-cost contraception, support for prescription refills that include collaboration with a regional pharmacy chain and reimbursement of out-of-pocket costs, access to the study clinic for ongoing care, support, and when needed, device removals, and the option to switch methods.

Given the structural inequalities endemic in American society, the effect of black race may be challenging to disentangle from external economic stratification where predisposing factors (low income, less education, lack of access to healthcare, and health insurance) may be concentrated in certain populations.<sup>42,43</sup> To better understand the role of financial considerations on rates of discontinuation, we conducted additional analyses stratified by receipt of public assistance at enrollment and by insurance status. These analyses confirmed our primary finding and found no statistically significant differences in discontinuation among black and white women receiving public assistance or with health insurance.

Strengths of this analysis include stratification by LARC method use, large sample size, a well-characterized cohort that has been compared to state and national reproductive-aged populations,<sup>44</sup> and a long duration of follow-up which permits assessment of differences at 12, 24, and 36 months. One limitation of our analysis is our inability to rule-out residual confounding, even with the use of propensity score analyses. Confounding due to unmeasured factors influencing both initial method selection and discontinuation may persist. Furthermore, it is difficult to disentangle the complex interactions between race and socioeconomic position in an observational analysis. Although the current findings may be limited in generalizability, the CHOICE cohort is similar to state and national populations with regards to use of multiple contraceptive methods.<sup>44</sup>

## Conclusions

Our research suggests that the dual interventions provided by CHOICE—evidence-based contraceptive counseling and no-cost contraception—may serve as an important strategy for the reduction of disparities in contraceptive discontinuation. The CHOICE interventions were patient centered and augmented by approaches to minimize barriers in access to

care through the establishment of a contraceptive home, support for quick start of hormonal methods and same-day insertion of intrauterine devices, and a partnership with a regional pharmacy to facilitate receipt of refillable methods. After CHOICE began the Affordable Care Act (ACA) which greatly expanded coverage of family planning services. While we cannot assume continuation of the ACA's current levels of coverage, studying this period of expanded coverage will allow us to study the effect of no-cost contraception on race-specific differences in contraception use and discontinuation at the population level across the United States.

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### Author Disclosure Statement

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### References

1. The Best Intentions. Unintended pregnancy and the well-being of children and families. Washington, DC: The Best Intentions, 1995.
2. Trussell J. The cost of unintended pregnancy in the United States. *Contraception* 2007;75:168–170.
3. Sawhill IV, Karpilow Q, Venator J. The impact of unintended childbearing on future generations. Washington, DC: Brookings Institution, 2014.
4. Henshaw SK. Unintended pregnancy in the United States. *Fam Plann Perspect* 1998;30:24–29, 46.
5. Finer LB, Henshaw SK. Disparities in rates of unintended pregnancy in the United States, 1994 and 2001. *Perspect Sex Reprod Health* 2006;38:90–96.
6. Finer LB, Zolna MR. Declines in unintended pregnancy in the United States, 2008–2011. *N Engl J Med* 2016;374:843–852.
7. Finer LB, Zolna MR. Unintended pregnancy in the United States: Incidence and disparities, 2006. *Contraception* 2011;84:478–485.
8. Winner B, Peipert JF, Zhao Q, et al. Effectiveness of long-acting reversible contraception. *N Engl J Med* 2012;366:1998–2007.
9. Trussell J, Henry N, Hassan F, Prezioso A, Law A, Filonenko A. Burden of unintended pregnancy in the United States: Potential savings with increased use of long-acting reversible contraception. *Contraception* 2013;87:154–161.
10. Shih G, Vittinghoff E, Steinauer J, Dehlendorf C. Racial and ethnic disparities in contraceptive method choice in California. *Perspect Sex Reprod Health* 2011;43:173–180.
11. Jacobs J, Stanfors M. Racial and ethnic differences in U.S. women's choice of reversible contraceptives, 1995–2010. *Perspect Sex Reprod Health* 2013;45:139–147.
12. Dehlendorf C, Park SY, Emeremni CA, Comer D, Vincett K, Borrero S. Racial/ethnic disparities in contraceptive use: Variation by age and women's reproductive experiences. *Am J Obstet Gynecol* 2014;210:526.e1–529.e9.
13. Dehlendorf C, Foster DG, de Bocanegra HT, Brindis C, Bradsberry M, Darney P. Race, ethnicity and differences in contraception among low-income women: Methods received by Family PACT Clients, California, 2001–2007. *Perspect Sex Reprod Health* 2011;43:181–187.
14. Mestad R, Secura G, Allsworth JE, Madden T, Zhao Q, Peipert JF. Acceptance of long-acting reversible contraceptive methods by adolescent participants in the Contraceptive CHOICE Project. *Contraception* 2011;84:493–498.
15. O'Neil-Callahan M, Peipert JF, Zhao Q, Madden T, Secura G. Twenty-four-month continuation of reversible contraception. *Obstet Gynecol* 2013;122:1083–1091.
16. Raine TR, Foster-Rosales A, Upadhyay UD, et al. One-year contraceptive continuation and pregnancy in adolescent girls and women initiating hormonal contraceptives. *Obstet Gynecol* 2011;117:363–371.
17. Phillips SJ, Hoffer LG, Modest AM, Harvey LFB, Wu LH, Hacker MR. Continuation of copper and levonorgestrel intrauterine devices: A retrospective cohort study. *Am J Obstet Gynecol* 2017;217:57.e1–57.e6.
18. Maslyanskaya S, Coupey SM, Chhabra R, Khan UI. Predictors of early discontinuation of effective contraception by teens at high risk of pregnancy. *J Pediatr Adolesc Gynecol* 2015;29:269–275.
19. Trussell J, Vaughan B. Contraceptive failure, method-related discontinuation and resumption of use: Results from the 1995 National Survey of Family Growth. *Fam Plann Perspect* 1999;31:64–72, 93.
20. Stuart JE, Secura GM, Zhao Q, Pittman ME, Peipert JF. Factors associated with 12-month discontinuation among contraceptive pill, patch, and ring users. *Obstet Gynecol* 2013;121:330–336.
21. Castano PM, Bynum JY, Andres R, Lara M, Westhoff C. Effect of daily text messages on oral contraceptive continuation: A randomized controlled trial. *Obstet Gynecol* 2012;119:14–20.
22. Tuchman LK, Huppert JS, Huang B, Slap GB. Adolescent use of the monthly contraceptive injection. *J Pediatr Adolesc Gynecol* 2005;18:255–260.
23. Garbers S, Haines-Stephan J, Lipton Y, Meserve A, Spieler L, Chiasson MA. Continuation of copper-containing intrauterine devices at 6 months. *Contraception* 2013;87:101–106.
24. Secura GM, Allsworth JE, Madden T, Mullersman JL, Peipert JF. The Contraceptive CHOICE Project: Reducing barriers to long-acting reversible contraception. *Am J Obstet Gynecol* 2010;203:115.e1–115.e7.
25. Spain JE, Peipert JF, Madden T, Allsworth JE, Secura GM. The Contraceptive CHOICE Project: Recruiting women at highest risk for unintended pregnancy and sexually transmitted infection. *J Womens Health* 2010;19:2233–2238.
26. Madden T, Mullersman JL, Omvig KJ, Secura GM, Peipert JF. Structured contraceptive counseling provided by the Contraceptive CHOICE Project. *Contraception* 2013;88:243–249.
27. Diedrich JT, Zhao Q, Madden T, Secura GM, Peipert JF. Three-year continuation of reversible contraception. *Am J Obstet Gynecol* 2015;213:662.e1–662.e8.
28. Peipert JF, Zhao Q, Allsworth JE, et al. Continuation and satisfaction of reversible contraception. *Obstet Gynecol* 2011;117:1105–1113.
29. Rosenstock JR, Peipert JF, Madden T, Zhao Q, Secura GM. Continuation of reversible contraception in teenagers and young women. *Obstet Gynecol* 2012;120:1298–1305.
30. Clayton DG, Hills M. *Statistical models in epidemiology*. Oxford, UK: Oxford University Press, 1993.
31. Sturmer T, Rothman KJ, Avorn J, Glynn RJ. Treatment effects in the presence of unmeasured confounding: Dealing with



- observations in the tails of the propensity score distribution—A simulation study. *Am J Epidemiol* 2010;172:843–854.
32. Chow SC, Shao J, Wang H. Sample size calculations in clinical research. New York, NY: Marcel Dekker, 2003.
  33. Behringer T, Reeves MF, Rossiter B, Chen BA, Schwarz EB. Duration of use of a levonorgestrel IUS amongst nulliparous and adolescent women. *Contraception* 2011;84:e5–e10.
  34. Littlejohn KE. Hormonal contraceptive use and discontinuation because of dissatisfaction: Differences by race and education. *Demography* 2012;49:1433–1452.
  35. Polaneczky M, Liblanc M. Long-term depot medroxyprogesterone acetate (Depo-Provera) use in inner-city adolescents. *J Adolesc Health* 1998;23:81–88.
  36. Hayford SR, Guzzo KB. Racial and ethnic variation in unmarried young adults' motivation to avoid pregnancy. *Perspect Sex Reprod Health* 2013;45:41–51.
  37. Callegari LS, Zhao X, Schwarz EB, Rosenfeld E, Mor MK, Borrero S. Racial/ethnic differences in contraceptive preferences, beliefs, and self-efficacy among women veterans. *Am J Obstet Gynecol* 2017;216:504.e1–504.e10.
  38. Guzzo KB, Hayford SR. Race-ethnic differences in sexual health knowledge. *Race Soc Probl* 2012;4:158–170.
  39. Hopkins B. Barriers to health care providers' provision of long-acting reversible contraception to adolescent and nulliparous young women. *Nurs Womens Health* 2017;21:122–128.
  40. Murphy MK, Stoffel C, Nolan M, Haider S. Interdependent barriers to providing adolescents with long-acting reversible contraception: Qualitative insights from providers. *J Pediatr Adolesc Gynecol* 2016;29:436–442.
  41. Grindlay K, Grossman D. Prescription birth control access among U.S. women at risk of unintended pregnancy. *J Womens Health* 2016;25:249–254.
  42. Anderson NB, Bulatao RA, Cohen B. Critical perspectives on racial and ethnic differences in health in late life. Washington, DC: The National Academies Press, 2004.
  43. Link BG, Phelan J. Social conditions as fundamental causes of disease. *J Health Soc Behav* 1995;Spec No:80–94.
  44. Kittur ND, Secura GM, Peipert JF, Madden T, Finer LB, Allsworth JE. Comparison of contraceptive use between the Contraceptive CHOICE Project and state and national data. *Contraception* 2011;83:479–485.

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