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## Contraceptive Desert? Black-White Differences in Characteristics of Nearby Pharmacies

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## Comments

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## Contraceptive Desert? Black-white differences in characteristics of nearby pharmacies

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### Abstract

**OBJECTIVES:** Race differences in contraceptive use and in geographic access to pharmacies are well established. We explore race differences in characteristics of nearby pharmacies that are likely to facilitate (or not) contraceptive purchase.

**STUDY DESIGN:** We conducted analyses with two geocode-linked datasets: (1) the Relationship Dynamics and Social Life (RDSL) project, a study of a random sample of 1,003 women ages 18–19 living in a county in Michigan in 2008–09; and (2) the Community Pharmacy Survey, which collected data on 82 pharmacies in the county in which the RDSL study was conducted.

**RESULTS:** Although young African-American women tend to live closer to pharmacies than their white counterparts (1.2 miles to the nearest pharmacy for African Americans vs. 2.1 miles for whites), those pharmacies tend to be independent pharmacies (43% vs. 12%) that are open fewer hours per week (64.6 vs. 77.8) and have fewer female pharmacists (17% vs. 50%), fewer patient brochures on contraception (2% vs. 5%), more difficult access to condoms (49% on the shelf vs. 85% behind glass, behind the counter, or not available), and fewer self-check-out options (3% vs. 9%). More African-American than white women live near African-American pharmacists (8% vs. 3%). These race differences are regardless of poverty, measured by the receipt of public assistance.

**CONCLUSIONS:** Relative to white women, African-American women may face a “contraception desert,” wherein they live nearer to pharmacies, but those pharmacies have characteristics that may impede the purchase of contraception.

### Keywords

Pharmacy; Race Differences; Contraceptive Use; Access to Pharmacies

## INTRODUCTION

African-American women who do not want to get pregnant tend to use contraception less consistently than their white counterparts [1–5] and thus have higher rates of undesired pregnancy [6]. The most common contraceptive method for young African-American women is condoms [5,7]. Condoms are one of the most easily accessible forms of birth control currently available, because they require neither a prescription nor a clinician visit, but they are more difficult to use consistently and thus their failure rate is substantially higher than hormonal methods [8].

Access to contraception may be an important determinant of this race difference in contraceptive use. Most research on access to contraception has focused on the cost of contraception, and insurance coverage for those costs [9–11]. Women without health insurance are dramatically less likely to use oral contraceptive pills (OCP), injectables, IUDs, or implants [9], and African-Americans are nearly twice as likely to be uninsured relative to whites [12]. Differential access to and experiences with health clinics explain some of the race disparity in contraceptive use [13–15]. However, 17% of young women who responded to a Kaiser Family Foundation survey indicated that they got their birth control at somewhere *other than* a clinic [16]; most likely, a pharmacy.

Past research on access to contraception in pharmacies has focused on emergency contraception (EC) [17–21] and oral contraceptive pills [22–26]. One FDA-approved EC method – levonorgestrel pills – has been available over-the-counter since 2013, and seven states permit pharmacists to prescribe and provide the other FDA-approved oral EC method (ulipristal acetate) (Alaska, California, Hawaii, Maine, Massachusetts, New Hampshire, and Washington) [27]. At this time, pharmacists can also prescribe some forms of oral contraceptive pills in five states – California, Colorado, New Mexico, Oregon, and Washington – and several other states have passed legislation that has not yet been implemented – Hawaii, Maryland, Ohio, and Tennessee. Legislation has been introduced in at least ten other states [28]. In several other states, pharmacists can prescribe other hormonal methods, such as contraceptive patches, self-administered injections, and the vaginal ring [28]. Thus, pharmacies have high and increasing potential for providing oral contraceptive access. Much less research has focused on other commonly-used contraceptive methods, but of course pharmacies provide condoms and spermicides, as well.

Our purpose in this study is to investigate race differences in a previously unexplored aspect of access to contraception – pharmacies. We focus on three critical features of pharmacies – accessibility, type, and characteristics – that may facilitate or impede contraceptive purchase, with a special emphasis on characteristics that facilitate or impede condom purchase.

## LITERATURE REVIEW

### Accessibility

There is a great deal of research on race differences in geographic access to pharmacies, as well as the availability of some specific services and products within pharmacies.

Researchers have documented “pharmacy deserts” (areas with a relatively small number of

pharmacies per capita), which are more prevalent in poor and minority areas [29–31]. More generally, geographic access to pharmacies is lower in poor and minority areas [29]. Further, poor and/or minority groups have less geographic access to and/or more expensive nearby options for the treatment of many specific disease, including asthma [32]; chlamydia [30], ADHD [29], hypothyroidism [29], and high cholesterol [33]; as well as less access to pain medication [29,34,35], nicotine replacement therapy [36], syringes [37], and immunizations [33]. In general, drug prices tend to be highest in the poorest zip codes [38]. No research has addressed race differences in the availability/ease of purchase of condoms or other contraceptive methods.

One important aspect of accessibility, in addition to geographic access, is a pharmacy's business hours. Poor and minority neighborhoods tend to be near pharmacies that are open fewer hours, which has been hypothesized to reduce medication adherence [33]. Further, young women have more positive attitudes toward pharmacy staff at pharmacies that are open more hours [39].

We hypothesize that African-American women have less access – in terms of both geography and business hours – to contraceptive services in pharmacies.

### Pharmacy Type

There are multiple types of pharmacies [40]. Some pharmacies are nearly invisible and are located inside clinics or hospitals. Other pharmacies are chain stores, like Walgreens, CVS, or Rite Aid. And, increasingly, others are inside mass retail outlets like Walmart or Target, or inside grocery stores. Nearly 40% of pharmacies in the United States are chain pharmacies. Approximately 3% are inside clinics, 11% are inside mass retailers, and 10% are in grocery stores. The rest of the pharmacies – about 35% – are independent, or privately owned – either a single store or a group of several stores.

Different types of pharmacies tend to have different characteristics. For example, 10% of chain pharmacies, but only 1.2% of independent and less than 1% of mass retailers or grocery store pharmacies provide 24-hour access [40]. Chain pharmacies are most likely to have drive-up service, but independent pharmacies are the most likely to have home delivery [40]. Grocery store pharmacies are most likely to accept e-prescriptions, and independent pharmacies are most likely to have multilingual staff [40]. Independent pharmacies tend to charge the highest prices [38]. In contrast, one study of California pharmacies (where pharmacists are permitted to prescribe multiple hormonal contraceptive methods) found that pharmacists working at chain and independent pharmacies did not differ in their likelihood of prescribing hormonal contraception [41]. However, Fakhri et al. [39] found that, overall, white and African-American young women rate their experiences with grocery store pharmacies more positively than their experiences with chain pharmacies.

Thus, we do not have a specific hypothesis about race differences in nearby pharmacy type, but our objective is to explore race differences in the types of pharmacies young women can access. We focus here on pharmacies that are open to the public – chain, grocery store, and independent pharmacies. We do not focus on pharmacies inside clinics or hospitals, as

accessing those pharmacies would require a visit with a clinician, and our purpose is to examine differences in access to contraception *beyond* differential access to clinicians.

### Pharmacy Characteristics

In addition to focusing on geographic access, research on race and socioeconomic differences in access to pharmacies has focused on specific characteristics and services, particularly those that facilitate medication adherence. Generic drug programs [33], immunization programs [33], and home delivery service [29] are less frequently available at pharmacies in poor and/or minority neighborhoods.

Of course, depending on the specific medication under investigation, different characteristics of pharmacies are likely to be important for adherence. In a study of pharmacy-level barriers to chlamydia treatment, pharmacists' knowledge, pharmacists' attitudes toward treatment, and medication costs varied by race and were hypothesized to affect treatment [30]. In addition to lower co-pays, 90-day refill options improved adherence to statin prescriptions [42], availability of pharmacists increased the probability of receiving a contraceptive injection at a pharmacy [43], and training in culturally competent pharmaceutical care improved compliance with antihypertensive drug therapy and resultant blood pressure [44]. Based on this body of research, we explore two types of pharmacy characteristics that are likely to facilitate contraceptive use: ease of access to information, and ease of condom purchase.

**Information.**—Relative to white women, African-American women have about 25% lower odds of being very sure that they could use a contraceptive method as indicated [45]. Many (> 30%) young women are very positive about pharmacists as a source of information about contraception, but fewer have ever talked to pharmacy staff about contraception [39]. Access to information is likely to become especially important as the number of states where pharmacists can dispense oral contraceptive pills increases, but even before that, pharmacists and pharmacies can provide information on other methods, including emergency contraception, and also condoms.

Based on research demonstrating the importance of a culturally sensitive pharmaceutical care intervention [44,46], we speculate that female pharmacists may facilitate young women's access to information, and that African-American pharmacists may facilitate young African-American women's access to information, by increasing their comfort with having a conversation with the pharmacist. Our rationale is that young women likely perceive female pharmacists to understand their reproductive health needs, and that African-American pharmacists have more in common culturally with young African-American women in their neighborhoods than white pharmacists. This is buttressed by research demonstrating that African Americans prefer African-American healthcare providers [47], and that female pharmacists are more willing than male pharmacists to prescribe and provide hormonal contraception [41]. We examine whether female and/or African-American pharmacists are more available in pharmacies near African-American or white women.

Given that young women generally lack information about contraception but trust pharmacies to provide it [39], patient brochures also have the potential to provide such

information. Reinforcing this idea, research on nicotine replacement therapy (NRT) interpreted visible advertising about NRT, and lack of visible advertising about cigarettes, as encouraging NRT purchases [36]. We similarly speculate that patient brochures may serve as a visible advertisement for or facilitator of contraceptive access. We hypothesize that the pharmacies nearby African-American women will be less likely to have patient brochures for contraception.

**Ease of Condom Purchase.**—Given young African-American women’s heavy reliance on condoms, differential pharmacy characteristics that facilitate condom purchase may be important for their ability to use contraception consistently over a long period of time. Thus, we investigate race differences in two factors that are likely to facilitate condom purchase: location of condoms and presence of a self-check-out.

Pharmacies sometimes keep condoms in a locked cabinet, or even behind the counter, which deters condom purchase [48]. Some independent pharmacies even lack a “front of store,” in which case *everything* is behind the counter, even if it does not require a prescription. Young women are likely to find it easier to purchase condoms if they are stocked on the shelf with other over-the-counter items, rather than kept behind the counter, or not stocked at all [39].

Another barrier to condom purchase at pharmacies may be lack of privacy, particularly in settings where there is no female pharmacist, or for African-American women, no African-American pharmacist. Amsler and colleagues [49] found that although patients are indeed supportive of pharmacists’ involvement in their health care, inadequate privacy was a key obstacle to involving pharmacists in their care. If this is the case, young women may prefer to purchase condoms without directly interacting with a clerk.

We hypothesize that the pharmacies nearby African-American women will be less likely to have condoms with the other over-the-counter items, and will be less likely to have a self-check-out option.

## METHODS

### Dataset and Sample

The analyses presented here are a secondary analysis of two merged data sources: the 2008–2009 Relationship Dynamics and Social Life (RDSL) study and the 2013 Community Pharmacy Survey. The RDSL was conducted using a population-representative random sample of 1,003 women aged 18 or 19 residing in a single Michigan county, to investigate sexual behavior, contraceptive use, and pregnancy. The Community Pharmacy Survey provides information on 82 pharmacies that were in the county in 2009 where RDSL was implemented. Its purpose was to append pharmacy data to the RDSL study and to investigate how pharmacies contribute to variance in access to contraception in the study area. Both studies were approved by the (location blinded) Institutional Review Board.

### Study Design of the Relationship Dynamics and Social Life (RDSL) Study

The RDSL study focused on intimate relationships, sexual behavior, contraceptive use, and unintended pregnancy. The sample was drawn from public records – driver’s license and

personal ID card registries. The data collection included a 60-minute face-to-face survey interview, conducted between March 2008 and July 2009, assessing sociodemographic characteristics, attitudes, relationship characteristics and history, contraceptive use, and pregnancy history. A separate follow-up study interviewed the respondents weekly for 2.5 years (but the follow-up data is not used in these analyses).

In addition to geographic location (described below), we use two variables from the RDSL study in our analyses: African-American race and poverty. Race is a dichotomous, self-identified variable indicating African American or white. 42 respondents (4%) did not select African American or white; we do not analyze those respondents in this article. We use receipt of public assistance as a proxy for being poor.

Table 1 describes the study population, based on RDSL survey responses. Women who stated that their religious faith was very important or more important than anything else are coded as highly religious. A series of dichotomous variables indicate socioeconomic characteristics: whether the respondent's mother gave birth as a teen, whether she grew up primarily in a two-parent family, and whether her family received public assistance during her childhood. A four-category variable indicates education level: dropped out of high school, still enrolled in high school, graduated from high school (but not enrolled in post-secondary education), and enrolled in a 2- or 4-year college or a vocational, technical or other school. A dichotomous variable indicates whether she was currently working for pay. Four dichotomous variables indicate adolescent (prior to the study) experiences with sex and pregnancy: age at first intercourse  $\geq 16$ , two or more sexual partners, ever had sex without using contraception, and any prior pregnancies.

### Study Design of the Community Pharmacy Survey

In April 2013, all 82 chain, grocery, and independent pharmacies were invited to complete the faxed one-page Community Pharmacy Survey. The list of pharmacies in the county was from 2009 (designed to match respondents' location at the time of the RDSL survey) and was provided by the Michigan Board of Pharmacy, which licenses all pharmacists and pharmacies in the state of Michigan. Reminder faxes were sent 10 days after initial contact.

In the faxed survey, pharmacies were asked to list the hours they were open, by day. They also indicated whether there was a self-check-out at the pharmacy, where the condoms were located in the pharmacy (behind locked glass, behind unlocked glass, behind the pharmacy counter, on shelf with other OTC products, not available for sale in the pharmacy), and whether there were any brochures available (anywhere in the pharmacy) to customers about contraceptive methods (no evaluation was made of the content of the brochures). Finally, the survey contained a grid, with one row for each employee, and 10 columns that assessed whether the employee was:  $\geq 29$ , 30–49, 50+, female, male, African American, Latino/a, Asian, White, or other race/ethnicity.

We obtained information for 40 pharmacies via survey (49% response rate). The 42 non-respondents to both the initial and reminder fax were visited by a research assistant, similar to the method used by Bernstein and colleagues [36]. The research assistant observed and recorded the information on the surveys. Most variables were straightforward to obtain

(hours of operation, presence of self-check-out, location of condoms, brochures about contraception), except characteristics of the pharmacy staff (gender, race/ethnicity). The research assistant visually ascertained the apparent gender and race/ethnicity of the pharmacy staff who were present at the time of the visit, which occurred on a weekday between 9:00 am and 5:00 pm.<sup>1</sup>

The list provided by the Michigan Board of Pharmacy indicated whether pharmacies were part of a chain (e.g., Walgreens, Rite Aid, CVS), were inside a grocery or mass merchandise store (e.g., Kroger, Meijer, Wal-Mart), or were independent. (We did not include the 12 clinic- or hospital-based pharmacies in this analysis.)

Note that three pharmacies are missing data for one of the following variables: hours open per week, whether there were any patient education brochures about contraception, and whether there was a self-check-out. No pharmacies are missing data on more than one variable.

### Analytic Strategy

All analyses were conducted with Stata version 15. In all analyses, we use alpha levels of .05, .01, and .001, denoted in the tables with \*, \*\*, and \*\*\*. We also use a Bonferroni correction, noted in the text and tables, to adjust for elevated Type 1 error associated with conducting multiple statistical tests simultaneously. We use an “experiment-wise”  $\alpha$  of .05, and compute  $\alpha'$  based on .05 divided by the number of tests in each table.

We first present the means for the individual-level characteristics describing the women in the RDSL sample, and conduct *t*-tests for significant differences by race (shown in Table 1), to assess whether poverty could be a possible confounder of any race differences in pharmacies. Next, we present the means for the variables describing all pharmacies in the study area (shown in Table 2). Means were computed with the command *summarize*. All *t*-tests were conducted using the command *ttest*.

For our analyses of race differences in the pharmacy variables, data from the Community Pharmacy Survey were linked to the RDSL data using geocodes based on addresses of pharmacies and respondents. Geocodes were created using ArcMap version 10.5. For our main analyses, we linked each respondent to her nearest pharmacy. In Table 3, we assess race and poverty differences in the nearest pharmacy, by comparing the mean characteristics of the nearest pharmacy across groups of respondents (African-American vs. white, and poor vs. non-poor) using *t*-tests of statistical significance. In Table 4, we assess whether race differences are net of poverty differences using ordinary least squares regression (for continuous variables: distance and hours open), multinomial logistic regression (for the categorical variable pharmacy type), and logistic regression (for dichotomous variables: any African-American pharmacist, female pharmacist, patient education brochures, condoms on

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<sup>1</sup>Thus, one limitation of the Community Pharmacy Survey is that these characteristics of pharmacy staff are measured with a higher degree of error than the other, directly observable characteristics of the pharmacy. We discuss this further in the Limitations section. Chi-Square tests indicate no differences in pharmacy characteristics between the surveyed and the observed pharmacies (not shown in tables).

the shelf, and self-check-out). We used the commands *regress*, *mlogit*, and *logit*, respectively.

We also connected respondents to all pharmacies within varying radii, including one, five, and ten miles, and compare the mean of all pharmacies within the radius. For example, we compute the proportion of the pharmacies within ten miles that are chain pharmacies (for each respondent), and then compare the mean of that proportion (across respondents) for whites to the mean of that proportion for African Americans.

We also connected respondents to *all* of the pharmacies in the county. For each respondent, we computed a weight for each pharmacy based on the inverse distance from the respondent (giving more weight to nearby pharmacies more and less to distant pharmacies). Weights for specific pharmacies differ for each respondent, but weights for all 82 pharmacies sum to 1.0 for each respondent. We then computed a weighted mean for each characteristic of pharmacies for each respondent (e.g., the weighted mean weekly business hours for all pharmacies).

We refer to the results of these alternate specifications in the Results, below.

## RESULTS

### Characteristics of the RDSL Study Population

Table 1 presents the distributions of race and poverty, along with the other sociodemographic characteristics, for the full sample and separately by race. In all, 35% of the sample reported their race as African American. 27% of respondents were poor (receiving at least one source of public assistance at the time of the interview). In the full sample, 58% were highly religious, 37% had a mother who gave birth as a teen, 52% grew up with two parents, and 36% of their families received public assistance sometime during their childhood. Respondents' educational status was as follows: 8% had dropped out of high school, 13% were still enrolled in high school, 22% had graduated from high school (but were not enrolled in post-secondary education), and 57% were enrolled in a 2- or 4-year college or a vocational, technical or other school. 50% were employed. African-American women experienced more disadvantage than white women, and these differences are substantial and statistically significant, with the exception of education. Education differences are small (and are not statistically significant once a Bonferroni correction is applied). These links between race and poverty motivate our investigation into whether race differentials, if any, are explained by poverty differentials.

51% of respondents were 16 or younger when they first had sexual intercourse. By late adolescence (age 18 or 19), 60% had two or more sex partners, 48% had ever had sexual intercourse without using some method of birth control, and 26% had at least one prior pregnancy. African-American women in the RDSL sample had sexual experiences in their adolescence that put them at higher risk of pregnancy than did whites, and also higher rates of teen pregnancy, findings consistent with prior research [50,51].

### Characteristics of the Pharmacies

Table 2 presents access, type, and characteristics of the pharmacies. Pharmacies were open an average of 75.9 hours per week. There were 35 (43%) chain pharmacies, 28 (34%) grocery/mass merchandise pharmacies, and 19 (23%) independent pharmacies. Among all 82 pharmacies, 3 (4%) had an African-American pharmacist; 38 (46%) had a female pharmacist; 3 (4%) offered patient education brochures about contraception; 64 (78%) stocked condoms in easily accessible locations – on the shelf with other over-the-counter products; and 9 (11%) had a self-check-out, which makes condom purchases more private.

### Race Differences in the Nearest Pharmacies

Table 3 shows differences in access, type, and characteristics of pharmacies by race and poverty. Every race difference is statistically significant (the difference in patient education brochures about contraception is no longer significant when the Bonferroni correction is applied). And although African-American women live .8 miles closer than white women to their nearest pharmacy (1.2 miles vs. 2.1 on average), and are more likely to live near a pharmacy with an African-American pharmacist (8% vs. 3%), every other difference signifies greater/easier access to contraception for white women than African-American women.

The nearest pharmacy for whites is open 13.1 more hours per week than the nearest pharmacy for African Americans (77.8 vs. 64.6). Relative to white women, African-American women's nearest pharmacy was less likely to be in a grocery store (11% vs. 28%), which is the type of pharmacy in which young women have the most positive experiences [39]. The relative rarity of grocery store pharmacies for African Americans is consistent with what we know about "food deserts" – that is, African-American neighborhoods tend to lack supermarkets, and they instead must rely on convenience stores and small independent grocers [52].

In terms of having female pharmacists, contraception brochures, or self-serve condom selection and purchase – all characteristics likely to appeal to young women wanting to buy contraception, particularly condoms – pharmacies closest to African-American women are less likely than those closest to white women to have each of these options. That is, compared to white women, African-American women were less likely to live near a pharmacy with a female pharmacist (17% vs. 50%), to live near a pharmacy with brochures about contraception (2% vs. 5%), to live near a pharmacy with condoms on the shelf rather than behind the counter (49% vs. 85%), and to live near a pharmacy with a self-checkout (3% vs. 9%).

Each of these race differences in pharmacy characteristics is statistically significant regardless of whether we analyze the nearest pharmacy; all pharmacies within one mile, five miles, or ten miles; or a weighted average of all pharmacies in the study area.

### Poverty Differences in the Nearest Pharmacies

Table 3 also presents analyses of the extent to which the pharmacies differ for poor and non-poor women. Young poor women live .6 miles closer to a pharmacy than non-poor young

women (1.3 vs. 1.9 miles), but their nearest pharmacies are open, on average, 5.6 fewer hours per week (69.0 vs. 74.6). For both groups, the nearest pharmacy is a chain pharmacy (44% and 48%), followed by independent pharmacies (40% and 28%), and followed by grocery store pharmacies (16% and 25%; this difference is not significant with the Bonferroni correction). Comparisons of other characteristics of the nearest pharmacy across poor and non-poor women also show more pharmacies with characteristics that facilitate contraceptive purchase for the non-poor respondents, with poor women having a greater probability of living nearest a pharmacy with a female pharmacist (28% vs. 42%), a greater probability of having patient brochures about contraception (0% vs. 5%), and a greater probability of having condoms on the shelf rather than behind the counter (65% vs. 75%). Living nearest a pharmacy with an African-American pharmacist or a self-checkout did not statistically differ for poor and non-poor women.

### Race Differences net of Poverty Differences

The regression models in Table 4 test whether the race differences in the nearest pharmacies are net of poverty differences in the nearest pharmacies. In all cases but one (patient brochures about contraception), the large and significant race difference persists when an indicator of poverty is added to the model. Most of the poverty differentials seen in Table 3, on the other hand, are not statistically significant net of race differences. There are two exceptions. First, the race and poverty differences in distance to the nearest pharmacy are both large and statistically significant. Second, the poverty difference in the availability of patient education brochures about contraception is statistically significant, but the race difference is reduced by about 1/3 and no longer significant when poverty status is added to the model. (In addition, the race difference in having a self-check-out is no longer statistically significant when the Bonferroni correction is applied.)

Thus, regardless of whether they are poor, African-American women tend to live nearest pharmacies that are open fewer hours per week, are independent rather than chain or grocery store pharmacies, do not have a female pharmacist, do not have condoms available on the shelf rather than over the counter, and do not have a self-check-out. Overall, Table 4 demonstrates the presence of strong race differentials in the nearest pharmacies, regardless of poverty, that may act to disadvantage African-American women in their purchase of contraception, particularly condoms, in pharmacies.

## DISCUSSION

African-American women live closer to pharmacies, which is not consistent with our hypothesis, but those pharmacies are less facilitating for contraceptive purchase than the pharmacies near white women, which is consistent with our hypotheses. These findings are also consistent with other research demonstrating that key characteristics of pharmacies that improve medication adherence are less available in minority neighborhoods [29,33].

Although our analyses are not consistent with an overall “pharmacy desert” in this county, they are analogous to research on “food deserts,” showing that African Americans have high levels of access to food at convenience stores and gas stations, but that those locations do not facilitate access to *quality* food [52]. African Americans tend to live nearest to independent

pharmacies that are open fewer hours, have fewer female pharmacists, fewer brochures on contraception, more difficult access to condoms, and fewer self-checkout options. Thus, our analyses suggest that African-Americans in our sample may live in a “contraceptive desert,” where nearby pharmacies are geographically closer than for white women, but the barriers to contraceptive purchase are higher.

The one characteristic of the pharmacies nearest African-American women that may better facilitate contraceptive purchase than those nearest white women is their higher probability of having an African-American pharmacist. Although we are unaware of other research addressing this idea, having a race-matched pharmacist may improve communication and cultural sensitivity, which are important determinants of medication adherence and related outcomes [44]. Similarly, African-American pharmacists could make it easier for African-American young women to get information about contraceptive options and/or their use from their pharmacists, which may improve their uptake and consistent use.

Perhaps more important to note is that only 3 pharmacies in this county had an African-American pharmacist. Of course, this may be an undercount, given that 42 of the pharmacies did not respond to the faxed survey, and information about them was ascertained by a brief, direct observation at only one point in time. In terms of characteristics that are more easily observable, only 3 had patient brochures about contraception, and only 9 had a self-checkout. Although few pharmacies had condoms behind locked glass ( $n=3$ ), behind the pharmacy counter ( $n=6$ ), or not visible at all ( $n=5$ ), those pharmacies were more likely to be located near African-American respondents.

Given that the majority of young African-American women who use contraception use condoms [5,7], and that African-American women profess less confidence than white women in their ability to use contraception correctly [53,54], the relatively greater barriers they face in obtaining information and condoms via nearby pharmacies is significant.

## Limitations

The shorter distance for African-American women to their nearest pharmacy is likely due to population density. The African-American women in the RDSL are 2.91 times more likely than white women to live in the central city in the county, and 3.09 times more likely than white women to live in the seven zip codes in the county with population density greater than 1,000 people per square mile (one of the Census Bureau’s requirements for an area to be considered “urban”) (not shown in tables). However, the African-American women in the RDSL are about half as likely to own a car, relative to the white women (29% vs. 59%, respectively, not shown in tables), and even pharmacies that are one or two miles away could be difficult to access on foot. On the other hand, the more frequent urban residence of the African-American women translates into better public transportation options. Thus, geographic access is complex, and the RDSL did not collect information about preferred pharmacy or travel time to either the nearest or preferred pharmacy, thus we cannot draw strong conclusions about geographic access from this analysis.

Pharmacies are not the only places that sell condoms, and our analyses do not include information about gas stations and other types of convenience stores that may carry them.

They are also frequently available, at least in small quantities, from family planning clinics. However, pharmacies are likely the predominant source of condom purchase for our sample [55].

Our pharmacy survey had a relatively low response rate – 49%. Fortunately, we were able to visit the other 51% of pharmacies to directly ascertain the answers to most of the questions asked in the surveys. However, each pharmacy was only briefly visited at one point in time, and thus not all pharmacists were present at that time. Thus, it may be that more than 4% of the pharmacies in the study have an African-American pharmacist, and more than 46% of pharmacies have a female pharmacist. In addition, we did not collect information about the retail cashiers, who in some cases may be the only staff members to interact directly with individuals purchasing over-the-counter contraception.

Although our focus is on accessibility and characteristics of pharmacies, and not experiences at specific pharmacies, the analyses we presented here implicitly assume that women use the pharmacy closest to them. Our supplementary analyses assume that women use pharmacies within one, five, or ten miles. In fact, women may use pharmacies that are far from their home address, such as those near their place of work or school.

Although the RDSL sample was randomly selected and population-based, it consists of women residing in a single Michigan county, which may decrease the generalizability of the results. The very few Latinas in the county, and in our sample, precludes assessing them as a separate category. And although the ability to link the RDSL data to the pharmacy data collected in 2013 is a key strength, the RDSL dataset is now a decade old.

### Implications for Practice and/or Policy

Young women face a range of barriers to obtaining contraception. Clearly, pharmacies cannot eliminate all of these barriers. However, pharmacies could reduce inequalities in African-American and white women's pharmacy characteristics by increasing the ease of access to information and the purchase of condoms for African-American women. Our analyses suggest that racial disparities in pharmacies' facilitation of contraceptive purchase could be reduced by changing the pharmacies nearest to African-American women, by increasing hours of operation, African-American pharmacists, female pharmacists, patient education brochures about contraception, and self-check-out options, along with placing condoms on the shelf with other OTC products.

These changes could be particularly important given that the key barriers to hormonal contraceptive use perceived by African-American women – concerns about side effects, lack of information on new methods, and the confidence and ability to use the methods correctly [53,54] – could be addressed in part via information available at pharmacies. Further, as states continue to develop new regulations permitting pharmacists to prescribe hormonal contraception, this may provide an opportune moment to think about how to make pharmacies more “contraception-friendly,” in general.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent was obtained from all individual participants included in the study.

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## Appendix

**Appendix Table 1**

Comparison of Characteristics of Pharmacies within Five Miles, by Race and Poverty, Relationship Dynamics and Social Life (RDSL) study, Michigan, 2008–2009 (n=961 women, except where noted)

	Race			Poverty		
	White (n=628)	African American (n=333)	Race Difference	Non-poor (n=705)	Poor (n=256)	Difference by Poverty
<b>Access</b>						
Number of pharmacies within five miles	8.6	14.8	***	9.6	13.9	***
Hours open per week <sup>a</sup>	78.2	72.6	***	77.1	74.1	***
<b>Pharmacy type</b>						
% chain	50	37	***	47	41	***
% grocery/mass retail	31	21	***	29	24	***
% independent	19	42	***	24	35	***
<b>Pharmacy Characteristics</b>						
<b><i>Ease of Access to Information</i></b>						
% with any African- American pharmacists	2	10	***	4	7	***
% with any female pharmacists	50	35	***	47	40	***
% with patient education brochures about contraception <sup>b</sup>	4	3		4	3	
<b><i>Ease of Condom Purchase</i></b>						
% with condoms on the shelf with other OTC products	83	62	***	79	68	***

	Race			Poverty		
	White (n=628)	African American (n=333)	Race Difference	Non-poor (n=705)	Poor (n=256)	Difference by Poverty
% with self-check-out <sup>c</sup>	10	6	***	9	8	

\*  
p<0.05,  
\*\*  
p<0.01,  
\*\*\*  
p<0.001 (two-tailed independent samples t-tests with 959 degrees of freedom).

<sup>a</sup>One pharmacy was missing data on this variable, which was the nearest pharmacy for 4 women. N = 957 for this t-test.

<sup>b</sup>One pharmacy was missing data on this variable, which was the nearest pharmacy for 11 women. N = 950 for this t-test.

<sup>c</sup>One pharmacy was missing data on this variable, which was the nearest pharmacy for 17 women. N = 944 for this t-test.

## Appendix Table 2

Comparison of Characteristics of Nearest Pharmacy, by Race and Receipt of Public Assistance, Relationship Dynamics and Social Life (RDSL) study, Michigan, 2008–2009 (n=961 women, except where noted)

	Race × Poverty Interactions				Comparisons across Race × Poverty Intersections			
	White		African American		Poverty Differentials among:		Race Differentials among:	
	Non-poor (n=514)	Poor (n=114)	Non-poor (n=191)	Poor (n=142)	White	African American	Non-poor	Poor
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					Difference between columns:			
					(2) – (1)	(4) – (3)	(3) – (1)	(4) – (2)
<b>Access</b>								
Distance to nearest pharmacy (in miles)	2.2	1.3	1.2	1.2	–.9	***	–1.0	***
Hours open per week <sup>b</sup>	78.3	75.6	64.7	64.6	–2.7	–.1	–13.6	***
<b>Pharmacy type</b>								
% chain	54	61	29	30	7	1	–25	***
% grocery/mass retail	30	20	10	13	–10	*a	–20	***
% independent	16	19	60	57	3	–3	44	***
<b>Pharmacy Characteristics</b>								
<i>Ease of Access to Information</i>								
% with any African-American pharmacists	2	7	9	5	5	***	–7	***
% with any female pharmacists	51	46	20	13	–5	–7	–31	***
% with patient education brochures about contraception <sup>c</sup>	5	1	3	0	–4	*a	–3	*
<i>Ease of Condom Purchase</i>								
% with condoms on the shelf with other OTC products	86	82	47	51	–4	4	–39	***
% with self-check-out <sup>d</sup>	9	8	3	4	–1	1	–6	***

\*  
p<0.05,  
\*\*  
p<0.01,  
\*\*\*  
p<0.001 (two-tailed independent samples t-tests with 959 degrees of freedom).

<sup>a</sup>Test is no longer statistically significant when a Bonferroni correction is applied (“experiment-wide”  $\alpha = .05$ ,  $\alpha' = .0019$ ).

<sup>b</sup>One pharmacy was missing data on this variable, which was the nearest pharmacy for 4 women. N = 957 for this t-test.

<sup>c</sup>One pharmacy was missing data on this variable, which was the nearest pharmacy for 11 women. N = 950 for this t-test.

<sup>d</sup>One pharmacy was missing data on this variable, which was the nearest pharmacy for 17 women. N = 944 for this t-test.

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**Table 1**

Characteristics of young women aged 18–19, by Race, Relationship Dynamics and Social Life (RDSL) study, Michigan, 2008–2009 (n=961)

Measure	All (n=961)	White (n=628)	African American (n=333)	t-ratio for race difference
Variables used in the analyses				
% African American	35	--	--	--
% poor (receiving public assistance)	27	18	43	8.46 ***
Other variables describing the study population				
Sociodemographic Characteristics				
% Highly religious	58	44	84	12.70 ***
% mother gave birth as a teen	37	27	54	8.61 ***
% grew up with two parents	52	65	29	11.41 ***
% received public assistance during childhood	36	27	52	7.88 ***
Education				
% dropped out of high school	8	7	9	0.92
% still enrolled in high school	13	12	17	2.13 <sup>a</sup>
% graduated high school	22	24	18	2.15 <sup>a</sup>
% enrolled in post-secondary school	57	57	56	0.16
% Employed	50	56	38	5.59 ***
Adolescent Experiences with Sex and Pregnancy				
% had first sex age 16 or younger	51	46	62	4.91 ***
% had 2 or more sex partners by age 18/19	60	54	70	4.72 ***
% ever had sex without birth control by age 18/19	48	42	60	5.45 ***
% had any pregnancies before age 18/19	26	19	39	7.02 ***

\*  
p<0.05,

\*\*  
p<0.01,

\*\*\*  
p<0.001 (two-tailed, independent samples t-tests for white vs. African-American women, degrees of freedom = 959).

<sup>a</sup> Test is no longer statistically significant when a Bonferroni correction is applied ("experiment-wide"  $\alpha = .05$ ,  $\alpha' = .0036$ ).

**Table 2**

Means for Pharmacy Variables, Community Pharmacy Survey, Michigan, 2013 (N=82 pharmacies)

Measure	N (%)
Access to Pharmacy	
Hours open per week <sup>a</sup>	Mean = 75.9 SD = 21.5
Pharmacy Type	
% chain	35 (43)
% grocery/mass retail	28 (34)
% independent	19 (23)
Characteristics of Pharmacies	
Ease of Access to Information	
% with any African-American pharmacists	3 (4)
% with any female pharmacists	38 (46)
% with patient education brochures about contraception <sup>a</sup>	3 (4)
Ease of Condom Purchase	
Location of condoms	
% on the shelf with other OTC products	64 (78)
% behind unlocked glass	0 (0)
% behind locked glass	3 (4)
% behind the pharmacy counter	6 (7)
% not available for sale in the pharmacy	4 (5)
% other/could not locate	5 (6)
% with self-check-out <sup>a</sup>	9 (11)

<sup>a</sup>One pharmacy was missing data on this variable. (No pharmacies were missing data on more than one variable.)

**Table 3**

Comparison of Nearest Pharmacies, by Race and Poverty (*t*-ratios), Relationship Dynamics and Social Life (RDSL) study, Michigan, 2008–2009 (n=961 women, except where noted)

	Race			Poverty		
	White (n=659)	African American (n=333)	Race Differential	Non-poor (n=705)	Poor (n=256)	Poverty Differential
<b>Access</b>						
Distance to nearest pharmacy (in miles)	2.1	1.2	.8 *** (7.86)	1.9	1.3	.6 *** (5.80)
Hours open per week <sup>b</sup>	77.8	64.6	13.1 *** (11.18)	74.6	69.5	5.6 *** (3.79)
<b>Pharmacy Type</b>						
% chain	55	30	25 *** (7.83)	48	44	4 (1.03)
% grocery/mass retail	28	11	17 *** (6.04)	25	16	9 *** (2.86)
% independent	16	59	43 *** (15.02)	28	40	12 *** (3.70)
<b>Pharmacy Characteristics</b>						
<b>Ease of Access to Information</b>						
% with any African-American pharmacists	3	8	5 *** (3.64)	4	6	2 (1.47)
% with any female pharmacists	50	17	33 *** (10.57)	42	28	14 *** (4.13)
% with patient education brochures about contraception <sup>c</sup>	5	2	3 *** (2.15)	5	0	5 *** (3.18)
<b>Ease of Condom Purchase</b>						
% with condoms on the shelf with other OTC products	85	49	36 *** (13.18)	75	65	10 *** (3.11)
% with self-check-out <sup>d</sup>	9	3	6 *** (3.25)	8	5	3 (1.10)

\*  
p<0.05,

\*\*  
p<0.01,

\*\*\*  
p<0.001 (two-tailed independent samples t-tests with 959 degrees of freedom).

<sup>a</sup>Test is no longer statistically significant when a Bonferroni correction is applied ("experiment-wide"  $\alpha = .05$ ,  $\alpha' = .0025$ ).

<sup>b</sup>One pharmacy was missing data on this variable, which was the nearest pharmacy for 4 women. N = 957 for this t-test.

<sup>c</sup>One pharmacy was missing data on this variable, which was the nearest pharmacy for 11 women. N = 950 for this t-test.

<sup>d</sup>One pharmacy was missing data on this variable, which was the nearest pharmacy for 17 women. N = 944 for this t-test.

**Table 4**

Regression Models of Race and Poverty Differences in Characteristics of Nearest Pharmacy (*t*-ratios), Relationship Dynamics and Social Life (RDSL) study, Michigan, 2008–2013

Panel A Ordinary Least Squares (OLS) Regression Models									
	Distance to the nearest pharmacy		Hours open per week <sup>b</sup>						
African American (vs. white)	–0.82 (7.86)	*** (6.60)	–0.71 (6.60)	*** (11.18)	–13.13 (10.49)	–12.78 (10.49)	***		
Receipt of public assistance (vs. no receipt)		–0.46 (3.98)	***		–1.43 (1.09)				
N	961	961		957	957				
Panel B Multinomial Logistic Regression Models (additive effects on log-odds of dependent variable vs. chain pharmacy)									
	Grocery store pharmacy (vs. chain)		Independent pharmacy (vs. chain)						
African American (vs. white)	–0.28 (1.33)	–0.21 (0.97)	1.90 (11.40)	1.92 (11.08)	***				
Receipt of public assistance (vs. no receipt)		–0.3 (1.45)		–0.07 (0.36)					
N	961	961	961	961					
Panel C. Logistic Regression Models (additive effects on log-odds)									
	African-American pharmacist		Female pharmacist		Patient education brochures <sup>c</sup>		Condoms on the shelf with OTC products		Self-check-out <sup>d</sup>
African American (vs. white)	1.13 (3.46)	*** (3.21)	1.09 (3.21)	–1.59 (9.54)	–1.53 (8.97)	–0.94 (2.07)	–0.62 (1.35)	–1.82 (11.54)	–1.05 (3.11)
Receipt of public assistance (vs. no receipt)		0.18 (0.51)		–0.28 (1.64)	–2.35 (2.29)	–2.35 (2.29)	–2.35 (2.29)	0.02 (0.11)	–0.09 (0.29)
N	961	961	961	961	950	950	961	961	944

\* p<0.05,

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\*\*\*  
p<0.001 (two-tailed tests, 958 degrees of freedom except where noted).

- <sup>a</sup>Test for race difference is no longer statistically significant when a Bonferroni correction is applied ("experiment-wide"  $\alpha = .05$ ,  $\alpha' = .0028$ ).
- <sup>b</sup>One pharmacy was missing data on this variable, which was the nearest pharmacy for 4 women. N = 957 for this t-test, 954 degrees of freedom.
- <sup>c</sup>One pharmacy was missing data on this variable, which was the nearest pharmacy for 11 women. N = 950 for this t-test, 947 degrees of freedom.
- <sup>d</sup>One pharmacy was missing data on this variable, which was the nearest pharmacy for 17 women. N = 944 for this t-test, 941 degrees of freedom