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Reproductive health knowledge among African American women enrolled in a clinic-based randomized controlled trial to reduce psychosocial and behavioral risk, Project DC-HOPE

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ADDITIONAL INFORMATION

Dr. Michele Kiely had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Dr. Kiely can be contacted for the full trial protocol.

The authors have no potential conflicts of interest to report.

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Abstract

Background—Washington, D.C. has among the highest rates of sexually transmitted infections (STIs) and unintended pregnancy in the United States. Increasing women's reproductive health knowledge may help address these reproductive health issues. This analysis assessed whether high-risk pregnant African American women in Washington, D.C. who participated in an intervention to reduce behavioral and psychosocial risks had greater reproductive health knowledge than women receiving usual care.

Methods—Project DC-HOPE was a randomized controlled trial that included pregnant African American women in Washington, D.C., recruited during prenatal care. Women in the intervention group were provided reproductive health education and received tailored counseling sessions to address their psychosocial and behavioral risk(s) (cigarette smoking, environmental tobacco smoke exposure, depression, and intimate partner violence). Women in the control group received usual prenatal care. Participants completed a 10-item reproductive knowledge assessment at baseline (n=1,044) and postpartum (n=830). Differences in total reproductive health knowledge scores at baseline and postpartum between groups were examined via chi-squared tests. Differences in postpartum mean total score by group were assessed via multiple linear regression.

Results—Women in both groups and at both time points scored approximately 50% on the knowledge assessments. At postpartum, women in the intervention group had higher total scores compared to women receiving usual care (mean 5.40 [SD 1.60] vs. 5.03 [SD 1.53] out of 10, respectively; $p<0.001$).

Conclusions—While intervention participants increased reproductive health knowledge, overall scores remained low. Development of interventions designed to impart accurate, individually tailored information to women may promote reproductive health knowledge among high-risk pregnant African American women residing in Washington, D.C.

Keywords

African American; behavioral intervention; pregnancy; reproductive health; women's health

INTRODUCTION

Washington, D.C. has the highest rates of chlamydia and gonorrhea among adolescents and young women compared to all 50 states (Centers for Disease Control and Prevention [CDC], 2014). Young African American women in the District are disproportionately impacted by chlamydia and gonorrhea compared to other races and age groups (HIV/AIDS, Hepatitis, STDs and TB Administration Strategic Information Division, 2012). In addition, unintended pregnancies occurred at higher rates in Washington, D.C. than other states (Kost, 2015) and

more often among non-Hispanic African American women compared to non-Hispanic White and Hispanic women (Finer & Zolna, 2014). The infant mortality rate among African Americans in Washington D.C. is three times greater than among White infants (Mathews & MacDorman, 2013).

These adverse sexual health and pregnancy outcomes may be associated with inaccurate reproductive health knowledge. For instance, compared to White women, African American women are less likely to have accurate reproductive health knowledge regarding contraception effectiveness (Biggs & Foster, 2013). This lack of knowledge may impact women's behaviors. Frost and colleagues (2012) found that low knowledge about contraception and underestimating birth control effectiveness was associated with greater odds of having unprotected sex in the next three months among women age 18-29 years. Further, unprotected intercourse increases women's risk for unplanned pregnancy (American Congress of Obstetricians and Gynecologists, 2009) and sexually transmitted infections (STIs) (Institute of Medicine Committee on Prevention and Control of Sexually Transmitted Diseases, 1997). STIs can increase women's risk of poor pregnancy and birth outcomes, and can be transmitted from mother to baby (CDC, 2014).

Women with less accurate reproductive health knowledge may not have had medically accurate reproductive health education and what knowledge they did receive may be culturally biased. While sex and human immunodeficiency virus (HIV) education is currently mandated for all students in Washington, D.C., where African American women experience reproductive health disparities, there are no requirements that education is medically accurate and culturally congruent or unbiased (Guttmacher Institute, 2016; Lu et al., 2010). Additionally, while provision of contraception information is required and ways to avoid coerced sex are taught, there are no requirements to be inclusive of sexual orientation, to discuss consequences of teen sex and pregnancy, to teach skills for healthy decision-making regarding sex nor how to communicate with family about sex.

These institutional mandates on reproductive health education have the potential to impact the health of African American women in Washington, D.C. However, if women are not provided with culturally appropriate and accurate reproductive health information, they may not have the knowledge and skills to prevent STIs or unintended pregnancies. Adequate, medically accurate, and culturally appropriate reproductive health knowledge can have a large beneficial impact on individuals and society (Sonfield, Hasstedt, Kavanaugh, & Anderson, 2013). To address these adverse reproductive health outcomes, scholars suggest that providing reproductive education in adolescence in addition to other strategies may help close the gap in adverse birth outcomes between African Americans and Whites (Lu et al., 2010). In addition, the Centers for Disease Control and Prevention have recommended targeted interventions for African American women of reproductive age (CDC, 2009; CDC, 2014). It is possible that interventions designed specifically for African Americans can increase their reproductive health knowledge (Dunlop, Logue, Thorne, & Badal, 2013; Schover et al., 2011) or reduce their preconception health risks (Jack et al., 2015). However it is unknown whether the reproductive health knowledge component included within our intervention that addresses multiple risks impacts women's and fetus' health. It is also unclear whether reproductive health knowledge actually influences a woman's behavior.

Previous interventions to improve health risks typically either addressed a single risk behavior or multiple risk behaviors for general health (Prochaska & Sallis, 2004; Prochaska et al., 2008; Sorensen et al., 2003), cardiovascular disease (Hyman, Pavlik, Taylor, Goodrick, Moye, 2007) and cancer risks. More recent interventions have addressed HIV risk (Gollub, Cyrus-Cameron, Armstrong, Boney, & Chhatre, 2010) and multiple preconception health risks (Jack et al., 2015). Interventions addressing a single risk may not be as effective at tackling multilevel factors that affect reproductive health (Nigg, Allegrante, & Ory, 2002). More research is needed in this domain to assess comprehensive interventions that provide reproductive health knowledge and address psychosocial and behavioral risks among pregnant African American women residing in Washington, D.C. By increasing their reproductive health knowledge, pregnant African American women in Washington, D.C. may have healthier pregnancies and improvement in long-term health outcomes for themselves and their children. The objective of this study was to assess whether high-risk pregnant African American women who were residents of Washington, D.C. and enrolled in an intervention to address psychosocial and behavioral health risks had greater reproductive health knowledge compared to women in the usual care group at the end of the intervention.

MATERIAL AND METHODS

This study is part of the NIH-DC Initiative to Reduce Infant Mortality in Minority Populations (i.e., Project DC-HOPE, clinical trials.gov number BLINDED FOR REVIEW), a congressionally mandated program that aimed to reduce Washington, D.C.'s high African American infant mortality rates. The study was a collaboration between Children's National Medical Center, Georgetown University, George Washington University Medical Center, Howard University, the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development, the National Center on Minority Health and Health Disparities, and RTI International. This study was reviewed and approved by the institutional review boards of all participating institutions.

Project DC-HOPE was a randomized control trial (RCT) to evaluate the efficacy of an integrated behavioral intervention delivered during prenatal care (PNC). The goals of the intervention were to (1) reduce four psychosocial and behavioral risks—cigarette smoking, environmental tobacco smoke exposure (ETSE), depression, and intimate partner violence (IPV)—during pregnancy and (2) improve pregnancy outcomes. For more information about the study design and components of Project DC-HOPE see El-Khorazaty and colleagues (2007) and Katz and colleagues (2008).

While the main goal of the intervention was not to improve reproductive health knowledge, a reproductive knowledge education component was included because this knowledge could impact reproductive health and outcomes. Findings regarding the main goals of the intervention (changing psychosocial and behavioral risks and improving pregnancy outcomes) have been previously published by El-Mohandes and colleagues (2008, 2010, 2011, 2011), Joseph and colleagues (2009), and Kiely and colleagues (2010). This secondary analysis focuses on whether the intervention improved reproductive health knowledge.

Setting, Sample size, and Participants

Participants were recruited July 2001 through October 2003 at six prenatal clinics in Washington, D.C. Women were eligible if they were ≥18 years old, ≤28 weeks pregnant, Washington, D.C. residents, English speaking, and high-risk (defined as reporting ≥1 of the 4 designated psychosocial and behavioral risk factors of cigarette smoking, ETSE, depression, and IPV), and self-identified as being African American or Latina. While the Project DC-HOPE was congressionally mandated to address the high infant mortality rate among African-American women in Washington, D.C., study investigators considered it unethical to exclude Latina women from the intervention. Additional recruitment and site details are published elsewhere (El-Khorazaty et al., 2007).

A total of 2,913 women were screened and 1,398 met eligibility criteria. Among those who were eligible, 1,191 (85%) provided written consent to participate in a baseline telephone interview prior to randomization. Among those consented, 1,070 (89.9%) participated and were randomized to an intervention group or usual care group. Of the 1,070 participants, 1,044 were African American and 26 were Latina. We excluded Latina participants because the number was not a sufficient number to determine the effectiveness of the intervention. Ultimately, 521 African American women randomized to the intervention and 523 African American women randomized to usual care and were still pregnant at the time of the baseline interview. In this study we analyzed data from 406 and 424 participants in the intervention and usual care groups, respectively, who completed the reproductive knowledge assessment at follow-up.

Variables of interest

The Project DC-HOPE included data gathered using various measures to ascertain the impact of the intervention program. The main focus of this analysis was on the reproductive behavioral health component, which attempted to address gaps in women's reproductive health knowledge regarding sexually transmitted infections, vaginal infections, fertility, and the impact of pregnancy timing on development. A sub-focus was to determine whether time spent discussing reproductive health information affected reproductive health knowledge scores. The exposure of interest was the intervention and the outcome of interest was the reproductive health knowledge assessment score.

Measures and Procedures

Initially, recruitment specialists at the PNC clinics recruited women to participate in the study. Women consented to participate in the audio computer assisted self-interview (A-CASI) screening. If they were eligible, they were invited into the study and completed the baseline interview prior to randomization. Women then provided a second written consent.

To support recruitment, Project DC-HOPE hired African American women as recruitment specialists. They received extensive training, including about the importance of both verbal and non-verbal behavior. Behavior that was taught and reinforced was to be alert, clear spoken and good listeners; positive and assertive, but not aggressive; responsive to the women's reasons for reluctance, respectful and culturally congruent; confident, sincere and spontaneous in their introduction; and credible by knowing the objective of the project and

the activities required for participation. To promote participant retention in the study, investigators sought to reduce participant burden by scheduling all in-person activities to coincide with participants' prenatal care visits. These activities included the collection of biospecimens, dispensation of incentives, and delivery of the intervention sessions. Study staff maintained frequent telephone contact with participants to remind them of intervention sessions and to reschedule appointments. To support ongoing telephone contact, staff updated participants' contact information each time they had contact with participants and kept detailed documentation of the time and day of attempted phone calls (both successful and unsuccessful) to determine the best time to reach participants. Additional information about recruitment and retention are available in EI-Khorazaty and colleagues (2007).

During the baseline interview participants reported socio-demographic characteristics, reproductive history, and psychosocial and behavioral risks (cigarette smoking, ETSE, depression, and IPV). In addition, women completed a reproductive health knowledge assessment (primary outcome measure). They answered "True" or "False" in response to the following 10 questions (with correct answers): "Even if your partner says 'I had herpes once, but don't know anymore,' you can still get infected" (True); "A woman who becomes pregnant within one year of having a child is more likely to have a lower weight baby" (True); "The time women can get pregnant occurs on only one day in each menstrual cycle" (False); "For most sexually transmitted diseases, women usually get early symptoms or warning signs" (False); "Thin white vaginal discharge with a slight odor is normal for women" (True); "Waiting 2 to 3 months to get pregnant again gives parents plenty of time with their first baby to promote development" (False); "Babies are protected in the womb from getting a sexually transmitted disease from their mother" (False); "Some vaginal infections can cause pre-term labor" (True); "Frequent douching increases the likelihood that pregnant women will get vaginal infections" (True); "Women need at least a year to build up their body strength before having another baby" (False). Each participant was assigned a reproductive health knowledge score based on the number of correct responses during assessment. Correct answers were scored as one and incorrect answers were scored as zero for a potential range in total knowledge score from zero (no questions answered correctly) to ten (all questions answered correctly).

After the baseline assessment, women were randomly assigned to the intervention or usual care group. Women assigned to the intervention received an integrated, evidence-based cognitive behavioral intervention. This intervention was designed for delivery in a minimum of four sessions to address each psychosocial and behavioral risk factors (smoking, environmental tobacco exposure, depression, intimate partner violence) and included a reproductive health education component (Katz et al., 2008). The women randomized to the intervention needed to participate in eight sessions to have a "complete" intervention. Fifty-one percent of the women randomly assigned to the intervention received four or more sessions, while one-quarter of the intervention group women attended zero intervention sessions.

Master's level social workers or psychologists (interventionists) were trained by DC-HOPE investigators to deliver the intervention. Sessions were held privately in a room proximate to or within the PNC clinics, occurred immediately before or after routine PNC visit, and lasted

for an average of 35±15 minutes. At each intervention session, women identified which psychosocial and behavioral risks they had been experiencing. The interventionists then addressed all risks that women reported at each session, regardless of previously reported risks. Interventionists also provided women with reproductive health education, irrespective of whether or not the women were identified as having reproductive health risks. First, participants were provided information about women's reproductive anatomy. Next they were given information about reproductive tract infections (RTIs), which encompass both STIs and non-sexually transmitted infections. Information about RTIs included (1) how women can get RTIs, (2) the most common bacterial and viral RTI infections that can occur during pregnancy, (3) symptoms of specific RTIs, although RTIs may be asymptomatic, (4) the impact of RTIs on the pregnancy, fetus, and birth, and (5) the importance of talking to primary care providers about RTI prevention and treatment options (if any). Next, women were provided content about pregnancy timing, such as the ideal amount of time between pregnancies and the benefits of spacing pregnancies for mother and child. Next, women received information about fertility, which included (1) the typical length of the menstrual cycle, (2) usual timing of ovulation, and (3) how to identify the most fertile timespan in the menstrual cycle. At the end of the reproductive health education, an overview and review of topics was presented to women. Interventionists recorded the time spent on each reproductive health session in minutes.

Women who were assigned to the usual care group received their usual prenatal care. Usual PNC was determined by the standard procedures at the PNC clinics that women attended. Women in the usual care group did not receive any formal reproductive health sessions. All women completed follow-up interviews via phone 6-10 weeks postpartum during which they again completed the 10-question reproductive knowledge assessment. Interviewers and their supervisors were blinded to participants' randomization groups. After women gave birth, data on infant and pregnancy outcomes were abstracted from the medical records.

During screening or follow-up, women reporting suicidal ideation were immediately referred to the mental health consultation team rather than enrolled in the study because their urgent mental health needs. Women were evaluated and referred, as necessary. Ultimately ten women who were found to be potentially suicidal were referred for mental health care to address their immediate mental health needs. As financial incentives to compensate participants for their time and effort, women received $5 for completing the A-CASI screening, a 30-minute telephone card for providing main study consent, and $15 for each telephone interview. Women randomized to the intervention received additional compensation. They received (1) $10 gift certificate for each intervention session they attended and (2) additional $15 and $25 gift certificates for the first and second postpartum follow-up sessions, respectively.

Statistical Analysis

To preserve the randomization, participant data were analyzed according to their care group assignment, regardless of receipt of intervention, using an intent-to-treat approach. All statistical analyses were completed in 2014 and conducted using SAS version 9.1.3 (SAS Institute, Cary, NC). Data were analyzed for women in the intervention and usual care

groups who completed the 10-question reproductive health assessment at both baseline and follow-up post-partum. Chi-square tests were used to examine whether the proportion of correct responses for each reproductive health question differed by RCT group at baseline and post-partum. Because baseline knowledge scores did not differ between women in the intervention and usual care groups, we used multiple linear regression to assess if overall mean reproductive health knowledge score differed between groups postpartum.

RESULTS

Among the 1,044 (521 intervention group, 523 usual care group) women who completed the baseline reproductive health knowledge assessment, 80% (n=830; 406 in the intervention and 424 in the usual care groups) repeated the knowledge assessment at postpartum follow-up. No harms to participants were identified. Reasons for not receiving the intervention or usual care included withdrawal from the study (28 in the intervention and 12 in the usual care group) or no longer being eligible (14 in the intervention and seven in the usual care groups). Reasons for losing eligibility include: delivering prior to the baseline interview, experienced a voluntary or involuntary pregnancy loss, having a gestational age >28 weeks, being younger than 18 years old, or having previously been in the study. Nine women in the intervention and 21 in the usual care group were lost to follow-up. See Figure 1 for a flow diagram of participants through the study lifecycle. There were no demographic differences between women who did and did not complete the follow-up questionnaire (data not shown).

At baseline, the mean age of women was 25 years. Seventy-two percent were single and 70% had attained at least a high school education (Table 1). Mean gestational age at baseline was 19 weeks.

At baseline, there was no significant difference in mean total score on the reproductive health assessment between the intervention group and those assigned to usual care (mean baseline score intervention 4.76 [SD 1.58] vs. usual care 4.77 [SD 1.56], $p>0.05$). While the total scores at follow-up for women in the intervention group were significantly higher than those in usual care, both groups still answered only approximately 5 of the 10 questions correctly (mean follow-up score intervention 5.40 [SD 1.60] vs. usual care 5.03 [SD 1.53], $p<0.01$) (Figure 2). Figure 3 shows the proportion of women who responded correctly to each question on both baseline and follow-up assessments by trial arm (intervention vs. usual care). At follow-up, the proportion of women who answered questions correctly was greater among those who had received the education intervention compared to usual care for the following statements: women need at least a year to build up their body strength before having another baby; thin white vaginal discharge with a slight odor is normal for women; a woman who becomes pregnant within one year of having a child is more likely to have a lower weight baby; waiting 2 to 3 months to get pregnant again gives parents plenty of time with their first baby to promote development (all $p<0.05$). Less than half of women in both the intervention and usual care groups correctly responded to the following statements: women need at least a year to build up their body strength before having another baby (False; ≤13%); thin white vaginal discharge with a slight odor is normal for women (True; ≤19%); A woman who becomes pregnant within one year of having a child is more likely to

have a lower weight baby (True; ≤29%); for most STIs women usually get early symptoms or signs (False; ≤37%).

Over the course of the intervention, women received approximately 20 minutes (mean 19.4, standard deviation [SD] 12.6) of reproductive health education across the prenatal study visits. They received an additional seven minutes (mean 6.9, SD 3.2) of reproductive education during the postnatal visit. Neither the prenatal visit minutes nor the postnatal visit minutes were associated with the mean reproductive health knowledge score at follow-up (both $p>0.10$). Findings regarding psychosocial and behavioral risks and birth outcomes have been reported previously. Briefly, Project DC-HOPE was successful in improving birth outcomes (El-Mohandes et al., 2011) and reducing psychosocial and behavioral risks (El-Mohandes et al., 2008; Joseph et al., 2009; Kiely et al., 2010).

DISCUSSION

Project DC-HOPE was an intervention designed to reduce Washington, D.C.'s high African American infant mortality rate by addressing maternal risk factors. This project demonstrated that high-risk pregnant African American women could improve their reproductive knowledge through a short reproductive health education component while at the same time addressing multiple psychosocial and behavioral risks. Women in the intervention group had higher health knowledge at follow-up compared to women who received usual prenatal care (Figure 2) even though reproductive health information in the intervention was not tailored specifically to women's needs. Had the reproductive knowledge been tailored specifically to women's needs, the difference between groups might have been stronger. While statistically significant, the difference was small and the overall mean scores for women in both groups did not go above 60%. Also women in both groups did poorly on statements regarding infection symptoms (Figure 3). For example, ≤19% correctly responded "True" to the statement "Thin white vaginal discharge with a slight odor is normal for women," and ≤37% correctly responded "False" to the statement "For most sexually transmitted diseases, women usually get early symptoms or warning signs." However, this study demonstrates that there may be an opportunity to increase women's reproductive health knowledge during pregnancy by including reproductive education while also addressing multiple health and behavioral risks to promote more favorable reproductive health and pregnancy outcomes.

Like many urban women with low incomes, participants in our study faced challenges that could affect their knowledge acquisition. Many had low levels of education as well as significant drug and alcohol use, which the intervention did not address. In the future, it would be important to test how to best convey reproductive knowledge to a similar group of women.

Our study highlights a need for women to be provided with accurate reproductive health information and actionable skills. Interestingly, when Project DC-HOPE researchers asked a subsample of women in the intervention group to give their perceptions of the intervention, the majority (>88%) stated that the reproductive health information and skills were very helpful and that they were very likely to use the information and skills in the future (Katz et

al., 2008). If we put these findings in the context of the Stages of Change model (DiClemente et al., 1991), it is possible that many of the women in the study were in the contemplation stage and if ready, would have moved to the planning stage. In addition, It is possible that if they had been given information tailored to the stage they were in during the time of the reproductive knowledge sessions that more women could have been closer to using or able to use the knowledge gained during the sessions. Recent research has aimed to improve African American women's preconception health by using a health technology called Gabby. This program assessed their readiness to change and if they were in the precontemplative stage, they were provided with motivational interviewing dialog (Jack et al., 2015).

However, it is possible that these women in Project DC-HOPE who stated that they would use health information and skills gained in the intervention may act on incorrect information. We found that women on average scored about 50% on the reproductive health assessment. Also women in the intervention group scored similarly to women in the control group regarding how they can get STIs and the impact of STIs on pregnancy and fetuses. This highlights the need for interventions like the Project DC-HOPE to include comprehensive reproductive health education in a way that increases information and skill comprehension and retention, especially regarding STIs. Increased comprehension and retention would help ensure that women in the action stage of the Stages of Change model are using correct information and skills. One way to increase reproductive health knowledge and skills could be to provide information in a comprehensive way by taking a tailored approach. In the Project DC-HOPE intervention, women were presented with information and asked to recall that information via a 10-item assessment. This may not be the most effective way to increase women's reproductive health and skills. Instead, interventionists could assess women's reproductive knowledge and skills, as well as their reproductive health goals, resources, affect, and feelings (Lauver, Ward, Heidrich, Keller, Bowers, Brennan, Kirchhoff, & Wells, 2012). Based on this needs assessment, women and the interventionists had a discussion to address any knowledge and skills gaps in the context of their resources and other factors.

Another way to increase women's reproductive health knowledge and skills could be to involve women's partners and/or family and include communication skill-building in the intervention. This approach would allow women and their families to gain the same important and accurate reproductive health information and learn skills on how to communicate with others about reproductive health. Mandates for reproductive health education in Washington, D.C. do not require teaching students how to communicate to family about sex. Interventions that include partners and/or family that promote reproductive health knowledge and communication may benefit African American women's reproductive and prenatal health (Lu et al., 2010). Kiely and colleagues note that a major theme that came from the Project DC-HOPE was supporting and involving women's family in the intervention (Kiely, Davis, Thornberry, & Joseph, 2011). This is particularly relevant to reproductive health. Women become pregnant and get STIs from engaging with other people. Providing reproductive health knowledge and skills, including communication skills, to only the woman may not be sufficient to improve women's reproductive health: their partners could benefit from also having the same knowledge and skills as the women.

Clinicians may be well suited to provide women, their partners, and their family members with reproductive health information and communication suggestions during PNC visits. These frequent visits can provide opportunities for clinicians and women to discuss reproductive health information as well as to reinforce knowledge and skills. Future interventions similar to Project DC-HOPE could provide tailored reproductive health information and communication skill building to women and their partners and/or families to address their reproductive knowledge and communication needs. One approach is to design interventions based on the Stages of Change model and tailored specifically around women's reproductive health goals, resources, affect, and feelings.

Our findings should be interpreted within the limitations of our study as well as the overall Project DC-HOPE RTC. First, the women in this study were recruited from the Washington, D.C. area and may not be representative of African American women in other regions of the United States. Second, about 20% of the women who completed the baseline reproductive health knowledge assessment did not complete the follow-up assessment. However, women who did and did not complete the assessment did not significantly differ on any demographic variables. Third, the minimum number of intervention sessions was not delivered to a large proportion of participants. More on the recruitment and retention in Project DC-HOPE can be found in El-Khorazaty and colleagues (2007). However, women in the intervention group did change several behavioral risk factors (El-Mohandes et al., 2008; Kiely et al., 2010) and slightly improved their reproductive health knowledge at follow-up. Lastly, we are uncertain if the delivery of the minimum number of intervention sessions would have been lower when deployed under non-experimental conditions. Women were not followed to understand challenges they faced in completing the follow-up assessment or attending the minimum number of intervention sessions. To learn more about strengths and limitations of Project DC-HOPE as well as lessons learned, refer to El-Khorazaty and colleagues (2008), Kiely and colleagues (2011 & 2013), and Thornberry and colleagues (2010).

IMPLICATIONS FOR PRACTICE

This study has the potential to inform future research and practice. Researchers developing interventions to improve women's reproductive outcomes and health can build on the successes and overcome hurdles faced during Project DC-HOPE to investigate further how to include a reproductive health education component to the intervention. For example, researchers could improve the reproductive health education component to provide tailored information rather than the same information to all women. This improved education component could take a person-centered approach and assess women's stage as described in the Stages of Change model (DiClemente et al., 1991). Taking a person-centered approach would allow investigators to integrate a biopsychosocial perspective on improving reproductive health knowledge and incorporate women's and their family's goals, resources, affect, feelings, and beliefs (Lauver et al., 2002). Future interventions could also improve the reproductive knowledge component by including partners and/or family members. These improved interventions could (1) focus on the needs of the women and their partners rather than a reproductive health issue and (2) promote women's sharing power and responsibility with a care provider (Berwick, 2009; Mead & Bower, 2000). Interventions from clinicians

could also assess whether including a person-centered reproductive health education component to PNC visits could increase women's knowledge and skills without adding to clinician workload or disrupting their workflow.

CONCLUSIONS

Women in an intervention to reduce behavioral and psychosocial risks that included reproductive health education had higher knowledge scores at the postpartum follow-up compared to the control group. However the difference was small and the total scores at follow-up for both groups were low (<60%). Researchers interested in improving reproductive health and outcomes of high-risk women may consider developing tailored interventions to impart accurate, culturally congruent information.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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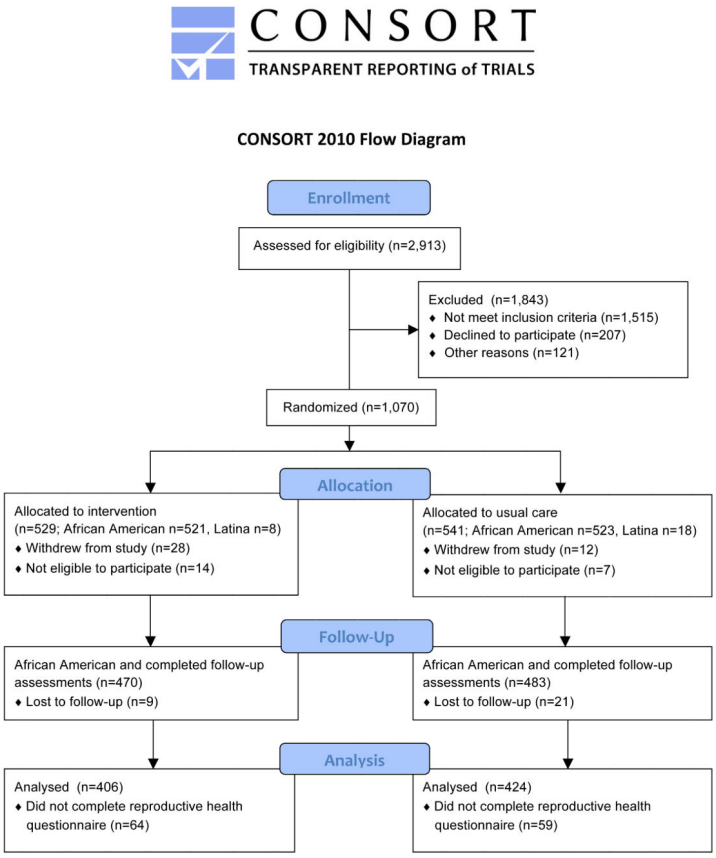

Figure 1.
CONSORT flow diagram of participants in Project DC-HOPE.

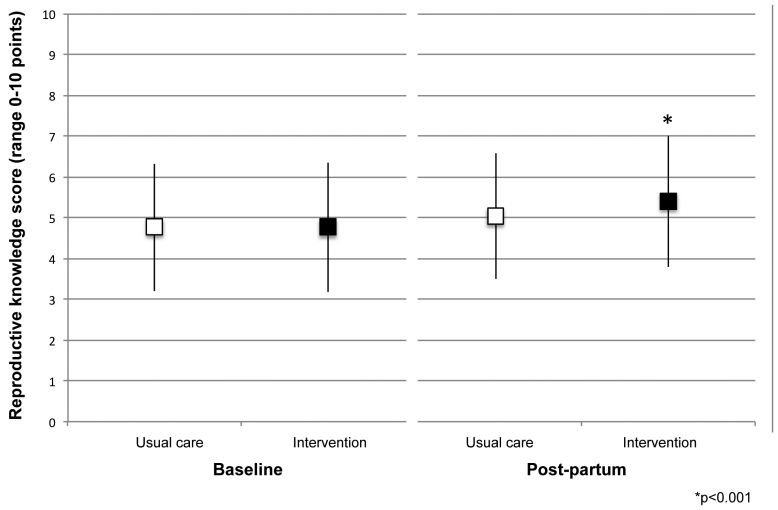

Figure 2.

Mean and standard deviation for total reproductive knowledge scores at baseline and post-partum by intervention arm, Project DC-HOPE.

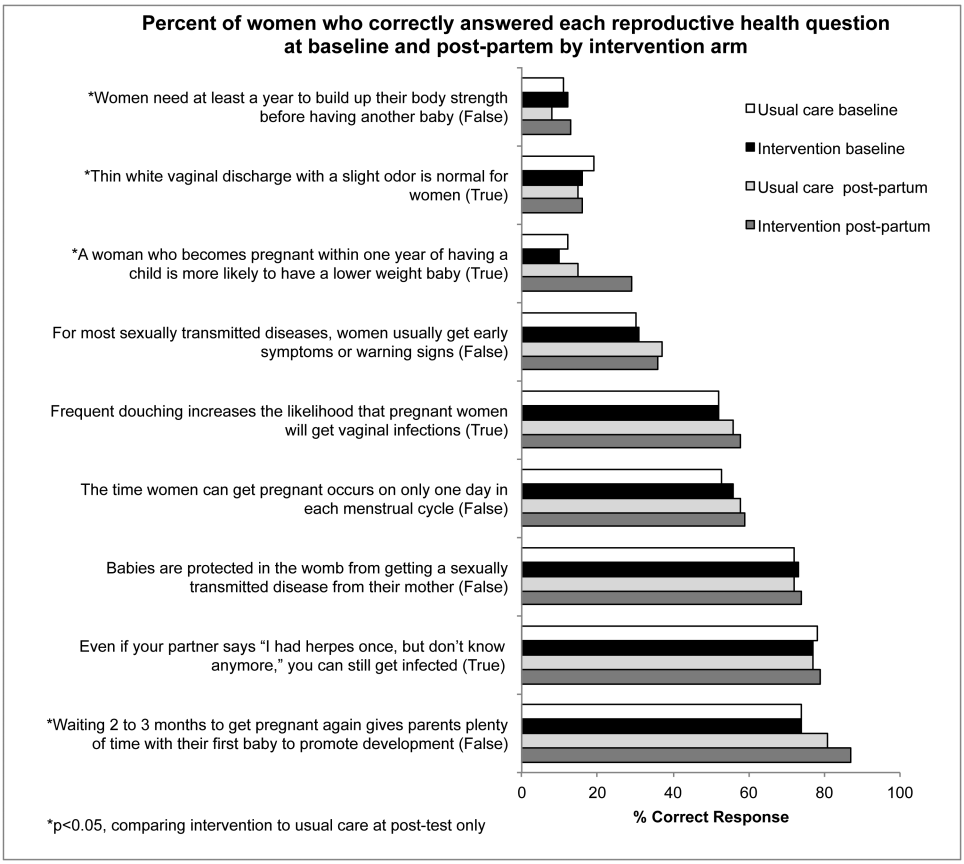

Figure 3.

Percent of women who correctly answered each reproductive health question at baseline and post-partum by intervention arm, Project DC-HOPE.

Table 1

Demographic information for African American DC Hope participants who completed baseline assessments.

Covariate		Intervention (n=521) n (%)	Usual Care (n=523) n (%)	p-value[b]
Maternal age		23 (5.49)	24 (5.32)	0.12
median (SD)				
Educational Level	<High School	159 (31)	157 (30)	0.86
	HS graduate/GED	245 (47)	241 (46)	
	At least some College	117 (22)	125 (24)	
Relationship Status	Single/Separated/ Widowed/Divorced	396 (76)	401 (77)	0.80
	Married or living with partner	125 (24)	122 (23)	
Currently Receive	Yes	293 (56)	297 (57)	0.91
Food stamps				
	No	226 (43)	226 (43)	
	Missing	2 (0)	. (.)	
Currently receive WIC	Yes	226 (43)	228 (44)	0.97
	No	294 (56)	295 (56)	
	Missing	1 (0)	. (.)	
Supplemental Food	Yes	6 (1)	10 (2)	0.32
Program	No	514 (99)	513 (98)	
	Missing	1 (0)	. (.)	
Currently receive	Yes	213 (41)	223 (43)	0.58
Public Assistance	No	306 (59)	299 (57)	
	Missing	2 (0)	1 (0)	
Currently employed	Yes	185 (36)	196 (37)	0.49
	No	336 (64)	326 (62)	
	Missing	. (.)	1 (0)	
Primiparous	Yes	173 (33)	163 (31)	0.48
	No	348 (67)	360 (69)	
Any Drinking During	Yes	111 (21)	112 (21)	0.98
Pregnancy	No	409 (79)	411 (79)	
	Missing	1 (0)	. (.)	
Illicit Drug Use	No	454 (87)	467(89)	0.28
During Pregnancy	Yes	67 (13)	56 (11)	
Prior STD[a]	Yes	234 (45)	240 (46)	0.86
	No	281 (54)	282 (54)	
	Missing	6 (1)	1 (0)	
STD at Postpartum	Yes	134 (26)	153 (29)	0.42
	No	297 (57)	302 (58)	
	Missing	90 (17)	68 (13)	

Covariate		Intervention (n=521) n (%)	Usual Care (n=523) n (%)	p-value[b]
Active Smoking	Yes	106 (20)	92 (18)	0.26
	No	415 (80)	431 (82)	
Depression	Yes	229 (44)	234 (45)	0.80
	No	292 (56)	289 (55)	

[a]Yes if pre-existing medical condition prior to this pregnancy was any of the following: Condyloma, HPV, Chlamydia, Genital Herpes, Gonorrhea, Syphilis, Other.

[b]p-values were obtained from chi-square tests for categorical variables and from a Wilcoxon rank sum test for maternal age.