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## Evaluation of an evidence-based intervention implemented with African-American women to prevent substance abuse, strengthen relationship skills and reduce risk for HIV/AIDS

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### ABSTRACT

African-American females in the U.S. are disproportionately affected by HIV/AIDS, and a large majority of new infections in this population are attributed to heterosexual contact. Risk factors include substance abuse, lack of knowledge about male partners' possible HIV infection risk, incarceration, disruptions of social networks, and intimate partner violence. This study assessed the effects of a comprehensive, evidence-based prevention intervention, Creating Lasting Family Connections (CLFC) that was implemented with sensitivity to African-American females, using a quasi-experimental design. The CLFC program was implemented with 175 women and their results were compared to a convenience sample of 44 women who were similar on background characteristics. Results showed significant ( $p < .05$ , two-tailed) increases in the proportion of individuals getting HIV tested and getting the results from these tests, a larger decrease in intimate partner abuse within the past three months, and larger increases in three relationship skills (emotional expression, interpersonal skills, and relationship satisfaction) relative to the comparison group.

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### KEYWORDS

HIV/AIDS; African-American females; substance abuse prevention; relationship skills; HIV testing

### Introduction

African-Americans have been disproportionately affected by HIV/AIDS since the early years of the epidemic (Sutton et al., 2009). African-Americans account for almost half of new HIV infections in the United States every year (44%) and over a third of all people living with HIV (41%). African-American women have an HIV incidence rate about 20 times the rate for white women and almost five times that of Hispanic women (CDC, 2016). Most new HIV infections among African-American women are from heterosexual sex (CDC, 2016).

Factors related to HIV/AIDS among African-American females include: lack of knowledge about male partners' risk for HIV infection (Hader, Smith, Moore, & Holmberg, 2001), substance abuse (CDC, 2008), intimate partner violence (Wingood & DiClemente, 1997), and incarceration (Johnson & Raphael, 2009), which disproportionately affects African-Americans (Carson, 2015). Prisons are high-risk environments for HIV transmission, and among reentry individuals, factors like disruption of social networks may increase infection risk (Hoffman, Su, & Pach, 1997). The compromised economic security of reentry individuals may increase the likelihood of "survival sex" or risky drug use (Laurencin, Christensen, & Taylor, 2008),

or reduce their ability to access needed services (National Conference of State Legislatures, 2009). African-American women in abusive relationships are less likely to use condoms and more likely to experience verbal or emotional abuse when they discussed condoms, emphasizing the need for HIV prevention programs to address domestic violence prevention (Wingood & DiClemente, 1997). Morales-Alemán and colleagues (2014) note that interventions enhancing skills to decrease HIV and IPV risk help decrease racial and ethnic disparities among women.

It is important to expand HIV testing and access to care, develop new interventions, scale up effective interventions, and mobilize the African-American community to combat the crisis (Sutton et al., 2009). Laurencin and colleagues (2008) cite as culturally specific strategies to address HIV/AIDS among African-Americans: building linkages with organizations serving African-Americans to make HIV prevention information and services widely available, promoting HIV testing, and mobilizing community action.

### Creating lasting family connections (CLFC) program

The original Creating Lasting Family Connections (CLFC) (Johnson et al., 1996, 1998) is one of three

evidence-based programs developed by COPEs, Inc. and listed on SAMHSA's National Registry of Evidence-based Programs and Practices (NREPP). Each program incorporates drug and alcohol abuse education with skill building in communication, relationship management, refusal skills and accessing health services. Premised on social learning theory and on reducing risk and enhancing protective factors, CLFC seeks to modify participants' attitudes and help them (1) strengthen families and establish family harmony, (2) enhance parenting skills, and (3) minimize the likelihood of further personal problems (e.g., substance abuse, prison recidivism). In 2004 COPEs adapted CLFC to also address prevention of risky sexual behavior and HIV infection among minority populations.

The CLFC program implemented in this study was funded through CSAP's MAI Ready to Respond project, which was focused on African-American females. This project included the same Creating Lasting Family Connections: Fatherhood Program (CLFCFP) components [shown to increase relationship skills and HIV knowledge, and reduce recidivism (McKiernan, Shamblen, Collins, Strader, & Kokoski, 2013)], with sensitivity to the African-American female target population. CLFCFP includes 18 sessions (each two hours) organized in four modules. "Raising Resilient Youth" addresses positive relationship skills, parenting (or mentoring) skills, family feelings meetings, and creating expectations and consequences in healthy relationships. "Developing Positive Parental Influences" addresses substance use, abuse, and chemical dependency related knowledge, attitudes and behaviors and how to incorporate substance abuse and violence prevention messages and activities with children. "Getting Real" addresses communication, relationship and conflict resolution skills with an emphasis on developing effective refusal skills, the skills of saying "no" with integrity, sensitivity and personal power in relationships. The "ABC(3)D Approach to HIV, Hepatitis and STD Prevention" module examines how HIV, Hepatitis and STDs are both transmitted and prevented, and how to foster prevention practices in others including older children. This module is based on the developer's experience in prevention and treatment and on the ABC approach for HIV prevention developed and used in several African countries and refined by the President's Emergency Plan for AIDS Relief (PEPFAR) (2005). This CLFC approach includes (A) abstinence, (B) being faithful and (C) correct and consistent condom use (PEPFAR, 2005). The three D's (created by the CLFC Program Developer to supplement the ABC approach) include: (1) Demonstrate self-love and love for others by being tested for HIV, Hepatitis or other sexually transmitted diseases; (2) Disclose one's HIV, Hepatitis,

STD status to one's sex partner(s); and (3) Destigmatize AIDS. Participants were offered culturally relevant case management services for one year following program participation as a support mechanism fostering family enhancement. Staff assessed each case and made needed recommendations for culturally relevant treatment with partnering service providers.

Program sessions were led by two female staff able to demonstrate sensitivity to female participants. Project participants were offered HIV testing by a community partner agency. The project targeted outreach to African-American females through partner agency referrals and prior male participants. To address a lack of trust toward the biomedical community, the project created a bridge for the target population to access HIV testing through new testing events, social media to increase awareness of testing availability, and other environmental strategies.

## Method

### Measures

The measures consisted of those required for CSAP MAI grantees, and additional items assessing CLFC-targeted relationship skills. Most of the measures reflect single-item face-valid measures; however, some reflect scales (see Table 1). Alphas were acceptable for all scales ( $\alpha > .70$ ). Scale scores were calculated by summing the items comprising the scale. Sums of dichotomous items were taken for social support and HIV knowledge, where these measures are seen as causally indicated scales (see Bollen & Lennox, 1991).

Participants completed three multi-item subscales from the CLFC relationship skills scale adapted from items reported by Olson and colleagues (Olson, Fournier & Druckman, 1986; Olson & Schaefer, 2000; Barnes & Olson, 2003; Olson, 2006) to more closely align with CLFC content and principles: emotional expression ( $\alpha = .88$ ), interpersonal skills ( $\alpha = .85$ ), and relationship satisfaction ( $\alpha = .92$ ). Emotional expression items examine the respondent's ability to express emotions in various contexts. Interpersonal skill items examine the respondent's openness and ability to discuss their point of view with others. Participants respond using a 1 (strongly disagree) to 5 (strongly agree) Likert scale.

### Procedure

Program and comparison participants were recruited in cohorts from partner community organizations including probation and parole, a local college serving non-traditional students, an organization serving single parents

seeking higher education, and other local family service agencies. We used a year-round rolling recruitment process for both program and comparison group participants. Partner organizations provided recruitment services and held informational meetings, and about 50% of prospective participants who attended these meetings signed up as program or comparison participants. There were more recruitment events needed for the comparison groups.

Program participants were required to receive at least 80% of the program content. Comparison participants only received services as usual from the organizations conducting recruitments. While program services targeted African-American females 18 and older, no one was excluded based on gender, race, or ethnicity.

The survey was administered by non-facilitator staff at pre-test (i.e., prior to intervention activities), post-test, and follow-up (i.e., 3 to 6 months after post-test). Program participants completed the surveys in sessions separate from those in which the CLFC modules were implemented, and comparison participants took the surveys in a similar timeframe. Informed consent was obtained from all participants and all research activities were approved by the institutional review board of the

first author. Participants completed the paper and pencil surveys after having been read a standard set of instructions, and full proctoring was available if needed. Intervention participants were offered totals of up to \$50 in gift cards and comparison participants were offered totals of up to \$60 in gift cards as incentives to participate in data collection.

### Participants

As can be seen in Table 2, 219 individuals participated in the study where 175 (or 80%) participated in the CLFC program and 44 (or 20%) participated in the comparison group. Of the 175 intervention participants, 90 (or 51%) exposed to CLFC completed the post-test and follow-up surveys. Of the 44 comparison participants, 37 (or 84%) participated in the post-test survey and 35 (or 80%) participated in the follow-up survey.

Intervention and comparison participants were generally similar, so only characteristics of the entire sample are described in the text. The participants were in their mid-thirties (average age of 34), almost all female (99%), almost all were of a black race (89%), and very few reported Hispanic ethnicity (1%). Participants

**Table 1.** Study measures.

	Possible range		Observed pre mean	Scale reliability (a)	# items
	min.	max.			
<b>Risk factors</b>					
Perceived risk of alcohol, tobacco and other drugs (ATOD)	1	4	3.42	.71	3
Perceived risk of HIV	1	4	3.68	.90	6
Sexual self-efficacy	1	4	3.38	.85	6
HIV knowledge	0	100	76.00	–	6
Knowledge of services for HIV	0	1	.91	–	1
Knowledge of services for AOD (alcohol and other drug) misuse	0	1	.84	–	1
<b>Protective factors</b>					
Social support	1	4	3.74	<sup>a</sup>	4
Religiosity	1	4	3.36	.76	3
Family cohesion	1	4	2.81	.85	6
Talk with kids about dangers of alcohol, tobacco and other drugs (ATOD)	0	3	1.56	–	1
<b>HIV-related behavior</b>					
Ever HIV tested	0	1	.83	–	1
Ever HIV tested and got results (of entire sample)	0	1	.80	–	1
Number sex partners in past 3 months	0	10	1.16	–	1
Ever had risky unprotected sex	0	1	.28	–	1
Had risky unprotected sex past 3 months	0	1	.09	–	1
Last time had any sex was unprotected	0	1	.81	–	1
Ever had sex under the influence	0	1	.70	–	1
Had sex under the influence past 3 months	0	1	.29	–	1
Past 3 month intimate partner abuse	1	4	1.33	.71	4
<b>Relationship skills</b>					
Emotional expression	1	5	4.01	.88	9
Interpersonal skills	1	5	3.90	.85	8
Relationship satisfaction	1	5	3.76	.92	7
<b>Drug and alcohol use</b>					
Days used cigarettes in past 30 days	0	30	8.90	–	1
Days used other tobacco products in past 30 days	0	30	2.66	–	1
Days used alcohol in past 30 days	0	30	2.31	–	1
Days drank 4 or more drinks in past 30 days	0	30	1.41	–	1
Days drank 5 or more drinks in past 30 days	0	30	.58	–	1
Days used marijuana in past 30 days	0	30	2.01	–	1

<sup>a</sup>There was no variance in the scale items, as all individuals indicated that they had someone to talk about all concerns with or data were missing.

**Table 2.** Sample characteristics.

Sample size	Comparison	Program	Total
Pre-test	44	175	219
Post-test	37	90	127
Follow-up	35	90	125
Average age	35.34	33.99	34.27
Female	95%	99%	99%
Hispanic ethnicity	0%	1%	1%
Race			
White	8%	12%	11%
Black	93%	89%	89%
Education			
Average years of schooling	14.30	13.38	13.57
GED if <12 years of school	46%	45%	46%
Completed trade school	18%	33%	30%
Employment/education			
Employed	51%	44%	45%
Unemployed and could work	2%	5%	4%
Below poverty level	45%	58%	56%
Living arrangement			
Live with parents	9%	11%	11%
Live with children	45%	51%	50%
Live with spouse	34%	17%	20%
Live in own home	72%	77%	76%
Homeless	9%	6%	7%
Children			
Had first child before 19	35%	45%	43%
Live with more than 2 children	7%	18%	16%
Incarceration			
Ever incarcerated	26%	34%	33%
DOC referred	8%	13%	12%
Relationships			
In cohabiting relationship	26%	17%	19%
Heterosexual	88%	88%	88%

completed 13.57 years of school on average and about half (46%) of those who did not graduate high school completed their graduate equivalency diploma (GED). About one third (30%) completed a trade school degree. About half of the sample (45%) were unemployed and about half (56%) had income below the poverty line. Close to half (43%) reported having a child before the age of 19. One third (33%) of participants reported having been incarcerated and just over one tenth (12%) were referred to participate by the Kentucky Department of Corrections. About one fifth (19%) reported being in a cohabiting relationship and the vast majority (88%) reported that they were heterosexual.

## Analytic methods

Two alternative explanations for putative study findings are that (1) intervention effects could be due to non-random assignment of individuals to the intervention and comparison groups (i.e., a quasi-experimental design) and (2) effects could be due to participants who are likely to exhibit negative outcomes being more likely to drop out of CLFC. Both potential sources of selectivity biases were addressed using a Heckman analysis (Heckman, 1976). This approach involves using a probit regression examining participant background characteristics as predictors of (1) intervention group or (2) attrition status in

the first step. Intervention status was also included as a predictor when examining attrition as the dependent measure. The second step involves producing predicted scores, where these scores are transformed to an inverse Mills' ratio (IMR), and the IMR is included as a predictor in all further analyses. Missing background characteristic data were imputed using the expectation maximization algorithm (Dempster, Laird, & Rubin, 1977) for these analyses only.

Examining background characteristics as a predictor of intervention group, there was no evidence from the omnibus model test to suggest that differences in participant background characteristics predicted participation in condition;  $\chi^2(21) = 27.70, p = .15$ . However, there was evidence to suggest differential attrition, based on the omnibus model test,  $\chi^2(22) = 72.39, p < .0001$ . Specifically, those who were younger,  $\chi^2(1) = 4.77, p = .04$ ; those who completed trade school,  $\chi^2(1) = 4.22, p = .04$ ; and those who did not live in their own home were more likely to drop out of the study,  $\chi^2(1) = 3.95, p = .05$ . Even after statistically controlling for these background characteristics, those in the CLFC condition were more likely to drop out of the study than those in the comparison group,  $\chi^2(1) = 15.16, p < .0001$ . Based on these results, we created an IMR representing biases due to differential attrition.

The analyses examining differential change over time for those in the intervention group relative to the comparison group were examined using hierarchical linear modeling (HLM). Specifically, these models were posed as random intercept mixed model regressions to model repeated measurements, while allowing us to use all data (Raudenbush & Bryk, 2002). Our analyses examined continued increases over time (or linear effects), unsustained changes over time (or quadratic effects), condition (intervention vs. comparison), the interaction of condition and time effects (representing differential change by conditions), and our correction for selectivity as predictors of outcomes. Dichotomous outcomes (e.g., ever drinking and driving) were analyzed using hierarchical non-linear modeling (HNLM) assuming a binomial distribution and logit link function. We also calculated effect sizes for HLMs ( $r$ ) using the formulas reported by Cohen (1988), which is interpreted like a correlation coefficient. For reference,  $|.10|$  is considered small,  $|.30|$  is considered medium, and  $|.50|$  is considered large (Cohen, 1988). Odds ratios were calculated for HNLMs, which represent the odds of increase in the intervention group relative to the odds of increase in the comparison group. HLMs were performed using the nlme library (Pinheiro, Bates, DebRoy, & Sarkar, 2015) and HNLMs were performed using the lme4 library (Bates et al., 2015) in the R package (Ihaka & Gentleman, 1996).



## Results

Results showed that program participants reported significant changes in behavior related to HIV/AIDS regarding both testing and sexual violence. CLFC participants had larger sustained increases in the proportion of individuals getting HIV tested and obtaining the results from these tests, relative to comparison participants (see Table 3). The  $p$  values were  $<.01$  and  $<.001$  for these results, respectively. There was a sustained decrease in intimate partner abuse in the past three months among CLFC participants; however, there was an increase and then a decrease in intimate partner abuse in the past three months among comparison participants. While the results in Table 3 show that CLFC participants did regress somewhat to prior behavior by follow-up, there was still less relationship violence at follow-up for CLFC participants relative to comparison participants.

There were statistically significant linear time by intervention effects for three relationship skills (emotional expression, interpersonal skills, and relationship satisfaction) suggesting larger sustained increases for these skills in the CLFC group relative to the comparison group. Program participants showed effects that were significant at  $p < .01$  for each skill. Significant program effects on these skills are consistent with prior studies of CLFC with other target populations (McKiernan et al., 2013; Shamblen, Arnold, McKiernan, Collins, & Strader, 2013). Finally, there was a statistically significant quadratic interaction effect for knowledge of alcohol and other drug (AOD) services, which suggested that knowledge of these services increased for both CLFC and comparison participants; however, the increase happened at post-test for CLFC participants and at follow-up for comparison participants. Program participants showed a higher level of knowledge of AOD services (97% compared to 83% for comparison participants) that was sustained from post-test to follow-up. No other statistically reliable program effects were found.

## Discussion

This study found that the CLFC program consisting of training sessions (including an HIV/AIDS module) and case management services following program participation increased the proportion of African-American females who participated in getting HIV tested and obtaining their results. The results are consistent with the CDC's advocacy of expanding HIV testing among African-Americans (Sutton et al., 2009). The program may have also mobilized broader action in the community by increasing discussion of HIV/AIDS and merging

HIV/AIDS prevention with efforts against sexual violence, substance abuse, and mental illness (Laurencin et al., 2008).

Program participation made it more convenient to get tested, because participants were given an opportunity for testing during implementation. Even though this made testing more likely to occur in the intervention group, there was no known difference between conditions affecting the likelihood that a person would stay or go back to the test site for their results. We speculate that program participants may have been more likely to seek their test results because of increased awareness of the importance of knowing their HIV status. Preliminary support for this interpretation comes from a marginal sustained increase in sexual self-efficacy in the intervention group.

The larger sustained decrease in intimate partner abuse is encouraging given the relationship between abuse and decreased use of condoms by women (Wingood & DiClemente, 1997). The program also showed robust effects on relationship skills, replicating prior studies' results (McKiernan et al., 2013; Shamblen et al., 2013). This finding is important given the need to increase skills to address HIV and IPV among African-American women (Morales-Alemán, Hageman, Gaul, Paz-Bailey, & Sutton, 2014).

Participants were shown to have increased knowledge of AOD services. The project's emphasis on trust may have helped facilitate participants seeking information and services. The unsustained program effect noted, in which comparison participants' knowledge of services increased may have been partly due to comparison group members being exposed to signage and other materials about services at the program site, on the three occasions when they completed the surveys onsite. Given that substance use is one factor related to HIV/AIDS, increasing knowledge of AOD services can be an important way to address the risk in this population of HIV/AIDS.

We found no significant effects for a number of risk and protective factors. These measures were required for inclusion by all grantee projects and not directly targeted for change as were relationship skills, which were specific to the CLFC content. Our finding of no significant effects on AOD use may have been attributable to insufficient dosage from an 18-session intervention to produce change in drug use among adults.

This research had several limitations. The findings come from quasi-experimental research with a relatively small comparison group so they must be interpreted with caution. Specifically, differences between women exposed to the program and a similar sample of women not exposed could be an artifact of the

**Table 3.** Study results: differential change as a result of the CLFC program.

	Continuing (Linear) Change		Unsustained (Quadratic) Change		Comparison				Intervention			
	test	effect size	test	effect size	pre	post	follow-up		pre	post	follow-up	
<b>Risk factors</b>												
Perceived risk of alcohol, tobacco and other drugs (ATOD)	.70	.05	.51	.03	3.34	3.46	3.45		3.44	3.55	3.66	
Perceived risk of HIV	1.41	.09	.23	.01	3.70	3.84	3.76		3.68	3.84	3.85	
Sexual self-efficacy	1.78 <sup>+</sup>	.11	-.48	-.03	3.46	3.60	3.42		3.36	3.60	3.51	
HIV knowledge	-1.36	-.09	-1.80 <sup>+</sup>	-.12	72.87	77.03	84.31		76.78	81.65	80.19	
Knowledge of services for HIV	.92	1.35	-.81	.84	81%	84%	80%		94%	97%	94%	
Knowledge of services for alcohol and other drug (AOD) misuse	1.62	2.11	-2.42*	.53	67%	68%	83%	increase	89%	97%	97%	increase
<b>Protective factors</b>												
Social support	-.39	-.03	1.17	.08	3.58	3.81	3.74		3.78	3.93	3.93	
Religiosity	1.27	.08	-1.62	-.10	3.35	3.27	3.30		3.36	3.44	3.39	
Family cohesion	1.11	.07	.95	.06	2.98	3.09	2.95		2.77	2.90	2.90	
Talk with kids about dangers of alcohol, tobacco and other drugs (ATOD)	.35	.03	-.08	-.01	1.68	1.78	1.83		1.53	1.53	1.64	
<b>HIV-related behavior</b>												
Ever HIV tested	2.82**	4.61	-2.45*	.53	83%	76%	86%	unsustained decrease	83%	93%	97%	increase
Ever HIV tested and got results (of entire sample)	4.37***	5.98	-2.61**	.58	83%	68%	76%	unsustained decrease	80%	91%	94%	increase
Number sex partners in past 3 months	.18	1.08	-.35	.93	.86	.89	.83		1.24	.99	.89	
Ever had risky unprotected sex	-.67	.83	-1.49	.77	27%	16%	26%		28%	19%	17%	
Had risky unprotected sex past 3 mo.	.31	1.13	-.71	.83	9%	3%	6%		9%	6%	6%	
Last time had any sex was unprotected	-1.46	.66	-1.07	.84	84%	78%	86%		80%	79%	71%	
Ever had sex under the influence	-1.05	.75	-1.88 <sup>+</sup>	.74	73%	65%	66%		69%	67%	51%	
Had sex under the influence past 3 mo.	-1.78 <sup>+</sup>	.52	-1.95 <sup>+</sup>	.67	20%	14%	11%		31%	26%	10%	
Past 3 month intimate partner abuse	-2.18*	-.14	2.42*	.15	1.13	1.24	1.17	unsustained increase	1.37	1.15	1.18	decrease
<b>Relationship skills</b>												
Emotional expression	3.10**	.20	-.28	-.02	4.03	4.01	3.87	decrease	4.01	4.17	4.22	increase
Interpersonal skills	3.11**	.20	-1.28	-.08	3.95	3.87	3.69	decrease	3.88	4.08	3.98	unsustained increase
Relationship satisfaction	3.25**	.21	.23	.02	3.85	3.98	3.69	unsustained increase	3.74	4.10	4.13	increase
<b>Drug and alcohol use</b>												
Days used cigarettes in past 30	1.34	.09	-.95	-.06	4.93	3.61	3.22		9.86	8.97	8.97	
Days used other tobacco in past 30	-.23	-.02	-1.24	-.08	2.83	.47	.91		2.62	2.52	1.22	
Days used alcohol in past 30 days	1.05	.07	1.10	.07	2.14	1.91	.75		2.35	1.72	1.98	
Days drank 4 or more drinks in past 30	-.18	-.02	.62	.07	1.81	1.57	.20		1.30	.48	.28	
Days drank 5 or more drinks in past 30	1.06	.12	-.59	-.06	1.19	.50	.41		.41	.29	.24	
Days used marijuana in past 30 days	.74	.05	1.54	.10	2.89	2.69	.78		1.78	.60	1.37	

Notes: Description provided for the nature of significant effects. Odds ratios are the effect sizes calculated for dichotomous outcomes and r is calculated for continuous outcomes.

\*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ , <sup>+</sup> $p < .10$

comparison group representing a non-randomly assigned convenience sample, which was relatively small. Firm conclusions about effects of CLFCFP with female sensitivity and implemented with African-American women over 18 on the outcomes reported here await further replications with a randomized controlled trial. There was also high attrition among program group participants, which needs to be addressed in future program replications. Another limitation is that the sample in this study may not have been representative of African-American women in the community.

Nevertheless, the results suggest that the CLFC program implemented with sensitivity to African-American females can significantly impact HIV testing and relationship factors related to HIV/AIDS. The results also suggest that HIV prevention can be successfully implemented with a female target population as part of evidence-based prevention programming that incorporates drug and alcohol abuse education, skill building, and accessing needed health services. This is consistent with and builds upon our earlier published finding that the CLFCFP, the adult male-adapted version of CLFC, was successful with a male target population in increasing HIV knowledge. Given African-American women's increased risk, this represents an accomplishment that is consistent with CDC strategies to implement evidence-based preventive programming that is sensitive and appropriate to the needs of this target population.

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