The Perinatal Guidelines Evaluation Project HIV and Pregnancy Study: Overview and Cohort Description

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SYNOPSIS

Objective. The HIV and Pregnancy Study of the Perinatal Guidelines Evaluation Project is a prospective, longitudinal, multisite study established to: (*a*) assess the implementation of Public Health Service guidelines regarding the prevention of perinatal HIV transmission and (*b*) evaluate the psychosocial consequences of HIV infection among pregnant women. A distinctive aspect of the study is the use of an HIV-negative comparison group. This article describes the methodology of the study and baseline characteristics of the study sample.

Methods and Results. HIV-infected (n = 336) and uninfected (n = 298) pregnant women were enrolled from four geographic areas: Connecticut, North Carolina, Brooklyn, NY, and Miami, FL. The study included three structured face-to-face interviews from late pregnancy to six months postpartum for HIV-infected and uninfected women. Additional self-reports of medication adherence were collected for the HIV-infected participants, and the medical records of infected mothers and their infants were reviewed. Electronic monitoring of medication adherence was conducted for a subset of the infected women. The groups were successfully matched on self-reported characteristics, including HIV-risk behaviors. More than half of the uninfected women reported a high-risk sexual partner. Baseline comparisons indicated that both the HIV-infected and uninfected women had high levels of depressive symptoms, stress, and recent negative life events.

Conclusions. This study provides a unique description of the psychosocial and behavioral characteristics of a population of low-income women. The results of this study suggest that HIV infection is one of many stressors faced by the women in this study.

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The availability of interventions to reduce perinatal HIV transmission has led to nationwide efforts to encourage pregnant women to learn their HIV status.[1–3] The challenge has been to provide timely therapy and necessary services and to promote adherence while avoiding possible negative outcomes associated with an HIV diagnosis and the potential for adverse adjustment, both during pregnancy and postpartum.

Limited information is available regarding the psychosocial and behavioral consequences of being HIV-infected and pregnant. Studies have demonstrated substantial emotional distress in women with HIV.[4–7] However, infected and uninfected women with similar socioeconomic backgrounds and HIV risk histories experience similar rates of distress.[7,8] Without knowledge regarding the interaction between HIV infection and pregnancy, the availability of services, and the ability of pregnant women to adhere to prevention regimens, we cannot be assured that programs are adequate to address the needs of women fully, beyond trying to prevent transmission of HIV to their infants.

To consider these issues in the implementation of guidelines to prevent perinatal transmission, the Centers for Disease Control and Prevention (CDC) funded the Perinatal Guidelines Evaluation Project (PGEP). This project is intended to assist public health policy makers in evaluating these guidelines, their implementation, and the consequences for women and their families. This article focuses on the PGEP's HIV and Pregnancy Study, a longitudinal study of HIV-infected pregnant women and a matched comparison cohort of uninfected women.[9,10] The primary objectives of the study were to determine whether HIV-infected women and their children received recommended care; to determine the rates and predictors of successful adherence to medical regimens for HIV-infected women during pregnancy and for HIV-exposed infants; and to evaluate the psychological, social, and behavioral consequences of being HIV-infected and pregnant. The longitudinal nature of the study and the use of a matched comparison group allow for an examination of the unique contribution of HIV to psychosocial adaptation as well as the impact of other life stressors.

The aims of this article are to describe the methods and procedures of the HIV and Pregnancy Study, the characteristics of participants, and the results of baseline measurements. Our hypotheses were twofold: First, we expected that our matching process would be successful, such that the HIV-infected and uninfected groups would not differ from each other on key variables and such that values for the matching criteria would fall within expected ranges. Second, we hypothesized that the HIV-infected and uninfected groups would differ on psychological, social, and behavioral variables of interest. We expected that HIV-infected women would exhibit higher levels of stress and depression, would perceive lower levels of social support and higher levels of social isolation, and would have experienced greater numbers of stressful life events. In addition, we expected more difficulties related to partners (e.g., conflict, partner change) and more adverse health risk behavior among the HIV-infected women.

RECRUITMENT AND MATCHING PROCEDURES

Table 1 provides information regarding individual sites and numbers of enrolled participants from the four geographic areas: Connecticut, North Carolina, Brooklyn, NY, and Miami, FL.

The collaborating institutions were Yale University, New Haven, CT; Duke University–Durham and University of North Carolina, Chapel Hill; State University of New York–Downstate, Brooklyn; and University of Miami. The total number of participating clinics was 31, and in each geographic area the number of clinics that participated in recruitment ranged from 3 to 12. All procedures and materials were approved by Institutional Review Boards at each institution, participating clinics, and the CDC. Baseline interviewing was conducted from October 1996 through October 1998, and follow-up data collection concluded in August 1999.

Recruitment

HIV-infected women were recruited through infectious disease, high-risk prenatal, or general prenatal clinics; all HIV-infected women at participating clinics were eligible. Women in the HIV-negative group were recruited from prenatal clinics serving comparable populations, e.g., with similar racial/ethnic distributions and similar proportions of Medicaid patients. Women were eligible to participate in the comparison group if they tested negative for HIV during their pregnancy and were not participating in a concurrent PGEP study.[9,10]

Multiple recruitment strategies were used, which varied by participating clinics depending on the requirements of the particular clinic. Variations by clinic centered on initial contact with potential participants (i.e., clinic staff or study staff) and enrollment strategies (i.e., direct contact in the waiting room or by the participant contacting study staff). There were four possible scenarios for referral and enrollment into the study: (*a*) The study was introduced to the potential participant by a medical provider, information on how to contact the study staff was provided to the participant, and then the potential participant contacted

Table 1. Recruitment strategies and self-reported characteristics of study subjects, by site

Variable	*Connecticut (n = 55)*	*North Carolina (n = 135)*	*Brooklyn, NY (n = 224)*	*Miami, FL (n = 220)*
Number of participating clinics	7	12	9	3
Recruitment strategy[a]	1,2,3,4	1,2,3,4	2,4	2
Mean age (years)	28	25	30	28
	Percent	*Percent*	*Percent*	*Percent*
Race/ethnicity[b]				
Black	29.1	77.8	65.8	79.5
White	23.6	13.3	4.1	2.7
Latina	43.6	3.0	27.0	17.4
Education				
< High school/GED	48.0	44.4	62.8	52.6
High school/GED	25.0	22.6	20.6	29.1
> High school/GED	27.1	33.1	16.7	18.3
Enrolled in Medicaid	81.8	97.0	88.3	83.6
Mean income for previous month (dollars)	949	1,057	705	954
	Percent	*Percent*	*Percent*	*Percent*
Impoverished	69.2	61.0	82.7	71.5
HIV risk[b]				
Drug risk	14.0	2.2	3.4	6.8
Sex risk	36.0	34.8	52.9	21.4
No risk	50.0	63.0	43.8	71.8
Late entry to prenatal care[b]	21.8	31.2	22.2	22.2

[a]Recruitment strategies:

1. The study was introduced to potential participants by clinic staff.
2. The study was introduced to potential participants by study staff, who then enrolled potential participants.
3. Potential participants contacted study staff for enrollment.
4. Study staff were provided with contact information for interested potential participants and contacted these individuals for enrollment.

[b]Matching characteristics

study staff directly for enrollment if interested. (*b*) The study was introduced by a medical provider; if the potential participant was interested and agreed, contact information for that participant was given to study staff to initiate enrollment. (*c*) Potential participants saw materials about the study (e.g., flyers posted in clinics) and contacted study staff directly. (*d*) Study staff introduced the project to potential participants at the clinic and enrolled participants directly.

Matching

The HIV-uninfected group was selected for similar proportions to the HIV-infected group in HIV risk behavior, "race"/ethnicity, and late entry into prenatal care. Additional HIV-uninfected women were excluded when the target distribution had been reached.

To match the groups in terms of HIV risk behavior, women were categorized according to self-report as having *drug use transmission risk* (i.e., ever injected drugs), *sexual transmission risk* (i.e., never injected drugs but had sex with a male intravenous drug user, exchanged sex for drugs or money, or used crack cocaine), or *no HIV risk* (never injected drugs, never had sex with a male injection drug user or exchanged sex for drugs or money, and never used crack cocaine). For the purposes of matching, women who had both drug risk and sex risk were categorized as having drug risk and not included in the sex risk group.

To ensure that the HIV-infected and uninfected groups had similar proportions of the most representative racial/ethnic groups among the HIV-infected women, the study and comparison groups were

matched on any race/ethnicity category that included at least 10% of the total number of HIV-infected women. Race/ethnicity was determined by self-report.

Because late entry into prenatal care has been shown to be an indicator of a number of risk factors for mothers and infants, groups were matched in the proportion of women who were late entrants into prenatal care. Entry into prenatal care was determined by self-reports of date of first prenatal care visit and expected due date. Women were categorized as late entrants if they registered after 19 weeks gestation.

The groups were successfully matched by race/ethnicity and time of entry into prenatal care. Proportions were within 5% for racial/ethnic distribution (i.e., 70.8% of infected vs. 67.8% of uninfected women were black, 5.7% of infected vs. 8.1% of uninfected women were white, and 19.3% of infected vs. 20.5% of uninfected women were Latina) and percent of late prenatal care entrants (21.3% of infected women vs. 20.7% of uninfected women). The groups did not differ significantly in terms of drug risk (6.9% of infected vs. 3.4% of uninfected women) or sex risk (38.6% of infected vs. 34.3% of uninfected women). A higher, although not significantly higher, proportion of uninfected women (62.0%) than of infected women (54.6%) had no identified risk.

DATA COLLECTION PROCEDURES

Each of the women in both groups participated in one interview during pregnancy and two postpartum interviews. The baseline interview was administered to all participants no earlier than 24 weeks gestation. The two additional follow-up interviews were conducted 6 to 12 weeks postpartum (first postnatal follow-up) and 5 to 7 months postpartum (second postnatal follow-up). Ninety percent of the baseline interviews were conducted in English, 5% in Spanish, and 6% in Haitian Creole. All interviewers were conducted by study staff who were centrally trained in general interviewing techniques and study-specific procedures. Study coordinators at each site monitored the interviewers on a regular basis, and centralized as well as site-based retraining sessions were conducted.

In addition to these interviews, members of the HIV-infected group participated in several data collection procedures designed to assess factors particular to this group. An interview to assess acceptance of and adherence to the zidovudine regimen was conducted with these participants after the 32nd week of pregnancy. Prenatal, labor and delivery, and maternal hospital records and the hospital and pediatric medical records of the newborns were reviewed. In addition, a subsample of HIV-infected women participated in an adherence sub-study using Medication Event Monitoring System caps to provide detailed information on specific patterns of adherence. These data will be presented in a future publication.

Follow-up

Several strategies were used to enhance follow-up, including: (*a*) requesting contact information for friends, family, and case workers; (*b*) requesting permission to determine delivery date in order to determine when follow-up should take place; (*c*) maintaining contact with participants throughout the study; (*d*) offering financial incentives ($25–$40 per interview and for study completion depending on the site and type of interview); and (*e*) offering a choice of interview settings. Women were considered lost to follow-up if they could not be located after multiple phone calls, contact with key people, and contact with the clinic. Women who were lost to follow-up after the baseline interview were not replaced.

DATA MANAGEMENT

Data were entered, cleaned, and managed at the CDC. Data management was monitored by a subgroup of the project's Executive Committee, containing at least one investigator from each collaborating institution and the CDC.

MEASURES

Measures were developed or adapted specifically for this study unless otherwise indicated. For all scales, items were summed to form a single score with mean item replacement for missing values. Means, standard deviations (SDs), and internal consistency are provided for scales administered to both groups at baseline.

Demographics

Age, country of birth, race/ethnicity, and education were assessed at baseline. Housing was reassessed at all interviews. Employment and income were assessed at baseline and the second postnatal follow-up. Poverty status was assessed at baseline by comparing yearly household income to the poverty thresholds provided by the U.S. Census Bureau. Participants were categorized as "impoverished" if their reported yearly household income fell below the poverty threshold for that year.

Health care factors

Aspects of the receipt of general health care and health insurance status in the year before pregnancy and during the current pregnancy were assessed at baseline. Health insurance status, including infants' health insurance, was reassessed at both follow-up interviews.

HIV testing history was assessed among both groups at baseline. HIV-infected women were also asked about the timing of diagnosis, CD4 count, HIV-related hospitalization, medication history, and whether zidovudine had been offered to them and their acceptance and adherence to the zidovudine regimen. Questions regarding HIV-related medications were repeated at the 32-week adherence assessment and at both postnatal follow-up interviews.

Pregnancy and motherhood factors

Reproductive history was assessed at baseline. Based on two items, women were categorized as to whether their pregnancy was planned, not planned but not actively prevented, or actively prevented. Use of prenatal vitamins, use of prenatal care, reasons for missing appointments, and factors that enable use of prenatal care were assessed at baseline.

The Maternal-Fetal Attachment Scale[11] was administered at baseline. This 24-item scale assessed feelings of affiliation toward the fetus. At baseline, summed scores ranged from 24 to 91, and the total sample mean was 52.1 (SD = 10.57), Cronbach's alpha was 0.83 for the HIV-infected women and 0.79 for the uninfected women.

Attitudes toward motherhood were assessed at both postnatal follow-ups with two combined subscales from the Childbearing Attitudes Questionnaire.[12] These 16 items have been combined in previous studies to measure confidence in mothering abilities.[13]

Reproductive decision-making (i.e., contraceptive use, pregnancy planning, beliefs about future pregnancies) was assessed in both postnatal follow-up interviews.

Behavioral factors

The women were asked about smoking, eating, and sleeping habits at baseline as well as lifetime, prior year, pregnancy, and prior month history of alcohol and drug use (i.e., marijuana, crack, cocaine, heroin, injected heroin, other injected drugs, and methadone). At the first postnatal follow-up interview, the women were asked about all of these behaviors for the pregnancy, since the birth, and in the past month. At the second postnatal follow-up interview, women were asked about use of these substances since the birth and in the past month.

At baseline, women were asked about their lifetime, five-year, previous-year, and last-three-month history of sex with male injection drug users, men who had sex with men, men who had been in prison, men who had HIV/AIDS, or men with whom they exchanged sex for drugs or money. Participants were also asked to indicate the number of sex partners they had in the past five years, in the year before the current pregnancy, and in the last three months.

Current partner factors

Current partner status and partner factors (length, relationship to the baby, cohabitation, HIV status, injection drug history, contact, support, and conflict) were assessed at all interviews. Partner support was measured with three items regarding the degree to which the current male partner provided emotional and financial support. At baseline, scale scores ranged from 0 to 12, the total sample mean was 9.07 (SD = 2.72), and Cronbach's alpha was 0.68 for the HIV-infected group and 0.81 for the uninfected women. Partner conflict was measured with four items regarding the degree to which the participant had fights with her current partner and whether he had ever been emotionally or physically abusive. At baseline, summed scores ranged from 0 to 15, the total sample mean was 2.62 (SD = 2.60), and Cronbach's alpha was 0.67 for the HIV-infected group and 0.76 for the uninfected women.

Psychosocial factors

Social support was assessed at all three interviews using the Perceived Availability of Support Scale.[14] The original scale consisted of seven items; one item was added for this study regarding care of children. At baseline, scores ranged from 8 to 40, the total sample mean was 33.1 (SD = 6.79), and Cronbach's alpha was 0.85 for the HIV-infected group and 0.88 for the uninfected women.

Depressive symptoms experienced in the previous week were measured at all interviews using the Centers for Epidemiologic Studies Depression Scale (CES-D).[15] Five somatic items (e.g., questions about fatigue) were excluded due to potential confounds with HIV and pregnancy symptoms. At baseline, scores ranged from 0 to 42, the sample mean was 13.4 (SD = 9.25), and Cronbach's alpha was 0.87 for the HIV-infected group and 0.88 for the uninfected women.

Coping was measured at baseline using a short form of the COPE.[16,17] Participants were asked about their use of certain strategies to handle problems during the previous month. HIV-infected women were asked how they coped with having HIV, and HIV-uninfected

women were asked how they generally coped with problems.

Social isolation was measured at all interviews using the six-item Social Interactions Scale.[18] At baseline, scores ranged from 0 to 18, the total sample mean was 6.9 (SD = 3.68), and Cronbach's alpha for this scale was 0.62 for the HIV-infected group and 0.72 for the HIV-uninfected women.

Major disruptive stressors were assessed at all interviews using the Life Events Scale.[19] HIV-infected participants were asked whether they had experienced each of 31 events since their HIV diagnosis, and all participants were asked about the previous six months. The overall number of events experienced in the previous six months ranged from 0 to 20. At baseline, the total sample mean was 5.5 (SD = 3.77).

Stress was measured at all interviews using the short form of the Perceived Stress Scale.[20,21] The baseline scores ranged from 4 to 20, the total sample mean was 10.4 (SD = 3.28), and Cronbach's alpha was 0.60 for the infected group and 0.63 for the uninfected women.

Intrusive thoughts about HIV was measured in the HIV-infected group using the 15-item Intrusion Subscale of the Impact of Events Scale[22] adapted by Antoni et al.[23]

Infant factors

Supervision, support for infant care, breastfeeding practices, and receipt of and coverage for health care were assessed at both follow-up interviews. Infant temperament was measured by the easy/difficult temperament dimension of the Revised Infant Temperament Questionnaire.[13,24]

RETENTION AND PARTICIPATION RATES

In total, 634 women (336 HIV-infected, 298 HIV-uninfected) participated in the HIV and Pregnancy Study. Of the HIV-infected women, 78.1% received an adherence assessment. The most common reasons for missed adherence assessments were premature delivery, late baseline interview, or inability to contact the participant. Overall, 87.9% of women received at least

Table 2. Selected self-reported demographic characteristics of study participants

Characteristic	*Total sample (N = 634)*		*HIV-uninfected (n = 298)*		*HIV-infected (n = 336)*		*p-value*
Mean age (years)	27.8		27.4		28.3		0.04
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	
Race/ethnicity							NS
Black	440	69.4	202	67.8	238	70.8	
White	43	6.8	24	8.1	19	5.7	
Latina	126	19.9	61	20.5	65	19.3	
Other	25	3.9	11	3.7	14	4.2	
Education							NS
≤ 9th grade	105	17.4	40	13.5	65	21.2	
Some high school	218	36.2	112	37.7	106	34.6	
High school/GED	146	24.2	71	23.9	75	24.5	
Some college	118	19.6	67	22.6	51	16.7	
≥ Bachelor's degree	16	2.7	7	2.4	9	2.9	
Changed housing previous year							NS
0	261	43.9	114	41.2	147	46.4	
1–3 times	296	49.8	143	51.6	153	48.3	
>3 times	37	6.0	20	7.2	17	5.4	
Unemployed	494	78.5	230	78.0	264	79.0	NS
Received public income assistance	561	88.5	256	85.9	305	90.8	0.05
Enrolled in Medicaid	560	88.3	268	89.9	292	86.9	NS
Have health insurance	567	89.4	262	87.9	305	90.8	NS
Impoverished	387	73.0	178	72.4	209	73.6	NS
Mean income for previous month (dollars)	867		903		835		

NS = not significant

one follow-up interview; 83.1% of the HIV-infected women and 76.8% of the HIV-uninfected women received the first postnatal follow-up, and 76.3% of the HIV-infected women and 75.8% of the HIV-uninfected women received second postnatal follow-up interviews. Follow-up interviews were missed because of inability to contact the participant or withdrawal from the study. Medical records were obtained for 87.2% of the HIV-infected women.

Because numerous recruitment sites were used and participants were often referred by providers or other study staff, exact participation rates among HIV-infected women were difficult to determine. We estimate, based on the number of HIV-infected pregnant women known to be enrolled in care at participating clinics in Brooklyn and Miami, that more than 90% of the HIV-infected pregnant women at these recruitment sites were enrolled in the study. For Connecticut and North Carolina, it was impossible to derive reliable estimates because the size of the potential pool of participants was unknown, given the size of these geographic regions, the large number of participating clinics, and patients who moved from one clinic to another. Participation rates for eligible HIV-negative women were 94% at the Brooklyn site and 70% at the Miami site.

SAMPLE CHARACTERISTICS AND GROUP DIFFERENCES

The participants were primarily women of color, poor, with low levels of education and income (Table 2). This sample is very demographically similar to the more general population of HIV-infected women in the U.S.[8,25] Although there were few sociodemographic

Table 3. Pregnancy-related factors

	Total sample (N = 634)		*HIV-uninfected (n = 298)*		*HIV-infected (n = 336)*		
Factor	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*p-value*
Previous pregnancies							0.01
0	108	17.0	64	21.5	44	13.1	
1	127	20.0	52	17.4	75	22.3	
≥2	399	62.9	182	61.1	217	64.6	
Miscarriages							NS
0	413	65.1	193	64.8	220	65.7	
1	150	23.7	66	22.1	84	25.0	
≥2	71	11.2	39	13.1	32	9.5	
Abortions							NS
0	387	61.2	178	59.7	209	62.8	
1	143	22.6	66	22.1	77	21.1	
≥2	102	16.1	54	18.1	48	14.4	
Stillbirths							NS
0	604	95.6	286	96.0	318	95.2	
1	26	4.1	11	3.7	15	4.5	
≥2	2	0.3	1	0.3	1	0.3	
Live births							0.05
0	198	31.2	108	36.2	90	26.8	
1	166	26.2	72	24.2	94	28.0	
≥2	270	42.6	118	39.6	152	45.2	
Pregnancy planning							0.001
Actively preventing	194	30.9	68	22.9	126	38.2	
Not preventing/ not planning	312	49.8	168	56.6	144	43.6	
Actively planning	121	19.3	61	20.5	60	18.2	
Maternal-Fetal Attachment (mean score)	52.1		51.0		53.0		0.02

NS = not significant

Table 4. Behavioral factors

Factor	Total sample (N = 634) Number	Total sample (N = 634) Percent	HIV-uninfected (n = 298) Number	HIV-uninfected (n = 298) Percent	HIV-infected (n = 336) Number	HIV-infected (n = 336) Percent	p-value
Smoking							NS
Never smoked	271	44.4	125	43.1	146	45.5	
Stopped pre-pregnancy	61	10.0	31	10.7	30	9.3	
Stopped for pregnancy	92	15.1	44	15.2	48	15.0	
Smoked during pregnancy	187	30.6	90	31.0	97	30.2	
Alcohol use							
Year before pregnancy	281	44.4	153	51.3	128	38.2	0.001
During pregnancy	112	18.1	60	20.6	52	15.9	NS
Marijuana use							
Year before pregnancy	158	25.0	88	29.5	70	20.9	0.01
During pregnancy	59	9.8	39	13.7	20	6.2	0.002
Cocaine or heroin use							
Year before pregnancy	149	23.6	83	27.9	66	19.0	0.02
During pregnancy	105	17.0	61	20.8	44	13.5	0.02
Ever injected any drug	31	4.9	10	3.4	21	6.3	NS
Sex with risky partner							
Ever	388	65.7	177	59.4	211	72.0	0.001
Last 5 years	321	54.8	145	48.7	176	61.1	0.002
Year before pregnancy	232	42.3	114	42.7	118	41.8	NS
Last 3 months	135	25.6	65	25.7	70	25.5	NS
Mean number of male partners							
Last 5 years	8.3		9.1		7.4		NS
Year before pregnancy	3.2		3.8		2.5		NS
Last 3 months	1.2		1.5		0.91		NS

NS = not significant

differences between the groups, HIV-infected women tended to be older, and they were more likely to receive some form of public assistance.

The majority of women in the study reported two or more previous pregnancies (Table 3). Regarding their current pregnancy, HIV-infected women were more likely to report that they had been actively preventing pregnancy. This difference is in contrast to their higher scores on the Maternal-Fetal Attachment Scale, suggesting that despite their active prevention, their current pregnancy held a high degree of importance for them.

Members of both groups frequently reported histories of risky health behavior, including drug and alcohol use and high-risk sexual partners (Table 4). Despite their similarity in risk history and the fact that the groups were matched on use of injection drugs, the uninfected women in this sample reported higher levels of recent drug and alcohol use. Most women in both groups reported relatively few partners. Large majorities reported having had three or fewer partners in the previous five years (72.4%) or in the year before pregnancy (91.8%), and 70.9% said that they had had only one partner in the previous three months. There were no differences between the groups in numbers of partners. HIV-infected women were more likely to report having ever had a high-risk partner or having had a high risk partner in the last five years (Table 4). The groups also differed significantly in terms of the reported serostatus of women's main male partners, such that a higher percentage of HIV-infected women reported that their current partner was HIV-infected (Table 5). Although the difference was not statistically significant, almost twice as many HIV-infected women reported that their current partner had a history of injection drug use. Surprisingly, a large proportion of HIV-infected women reported that they "did not know" their partner's HIV status, whereas 97.3% of uninfected women reported that their partner was HIV-uninfected.

Table 6 shows that there were no differences between the groups in perceptions of social support, de-

Table 5. Partner factors

Factor	Total sample (N = 634) Number	Total sample (N = 634) Percent	HIV-uninfected (n = 298) Number	HIV-uninfected (n = 298) Percent	HIV-infected (n = 336) Number	HIV-infected (n = 336) Percent	p-value
Have a main male partner	518	81.8	258	86.6	260	77.6	0.004
Partner is baby's father	474	91.5	235	91.1	239	91.9	NS
Live with partner	297	57.3	139	53.9	158	60.8	NS
Serostatus of current main male partner							0.001
HIV-infected	56	10.8	2	0.8	54	20.8	
HIV-uninfected	363	70.2	251	97.3	112	43.2	
Don't know status	98	19.0	5	1.9	93	35.9	
Partner history of injection drug use	35	6.8	12	4.7	23	8.9	NS
	Mean		Mean		Mean		
Partner support score	9.07		9.18		8.97		NS
Partner conflict score	2.62		2.85		2.41		0.04
Length of relationship (years)	4.1		4.3		4.0		NS

NS = not significant

pressive symptoms, feelings of social isolation, or the experience of stress. Notably, both groups scored high on depressive symptoms. The standard cut-off for moderate severity of symptoms on the full CES-D is 16.[16] With the five somatic items omitted, the mean CES-D score in this sample was 13. Thus, even if participants had endorsed the missing items at low levels, a large proportion of the sample would fall above this cut-off.

Both groups reported recent stressful life events; 76.5% said they had experienced three or more such events during the past six months. Overall, HIV-uninfected women experienced more stressful life events; they were more likely to report problems with their current partner and with friends and family members (Table 7). It is of interest to note, that despite their HIV infection, this group was not more likely to report problems related to medical care. Both groups were equally likely to experience problems related to work, finances, and housing.

DISCUSSION

The HIV and Pregnancy Study provides a unique description of a group of women about whom little is known. The findings reported here indicate that when equivalent HIV-infected and uninfected groups of pregnant women are compared, they do not differ significantly on most psychosocial outcomes. Contrary to our hypotheses, the study found that both groups experience high levels of stress and depressive symptoms. These findings are consistent with the findings of studies comparing the psychological and social characteristics of HIV-infected and uninfected women that do not focus on pregnant women per se.[7,8] Although the HIV-infected women experienced fewer stressful life events and were more likely to receive public assistance than uninfected women, despite similar income levels, they did not report lower levels of distress. In addition, increases in service provision may be centered on efforts to prevent vertical transmission

Table 6. Psychological and social factors, by HIV status

Factor	Total sample (N = 634) Mean score	HIV-uninfected (n = 298) Mean score	HIV-infected (n = 336) Mean score	p-value
Social support	33.1	33.5	32.8	NS
Modified CES-D[a]	13.4	13.2	13.5	NS
Social isolation	6.9	6.7	7.1	NS
Stress	10.4	10.4	10.3	NS

[a]Centers for Epidemiologic Studies Depression Scale
NS = not significant

Table 7. Life events, by HIV status

Factor	Total sample (N = 634) Number	Total sample (N = 634) Percent	HIV-uninfected (n = 298) Number	HIV-uninfected (n = 298) Percent	HIV-infected (n = 336) Number	HIV-infected (n = 336) Percent	p-value
Problems with partner	365	57.6	187	62.8	178	53.0	0.01
Problems with friends or family	376	59.3	205	68.8	171	50.9	0.001
Illness or death among friends or family	276	43.5	129	43.3	147	43.8	NS
Problems with medical care	252	39.7	113	37.9	139	41.4	NS
Work or financial problems	412	65.0	200	67.1	212	63.1	NS
Problems with housing	237	37.4	114	38.3	123	36.6	NS
Prison	22	3.5	10	3.4	12	3.4	NS
Lost custody of child	33	5.2	15	5.0	18	5.4	NS
Mean number of life events	5.5		5.9		5.2		0.03

NS = not significant

and may not be available postpartum. Follow-up assessments from this study will provide important information regarding changes in income and services among HIV-infected women.

Although the groups were matched in terms of their HIV risk history, the level of ongoing health risk among the HIV-uninfected women in this study is striking. More than half of uninfected women reported a high-risk sexual partner, that is, a man who had sex with men, who used injection drugs, who had HIV/AIDS, or who had been in prison. In addition, the uninfected women had higher rates of recent and current use of hard drugs (all forms of cocaine and heroin). It is surprising that most HIV-uninfected women reported that their partner was not infected, whereas more than a third of HIV-infected women reported that they "did not know" their partner's HIV status. It is unclear whether the reports of uninfected women were based on assumptions because of their own negative status or results of their partners' HIV tests. If the former, these women could be at substantial risk for HIV infection because they are assuming their partner to be uninfected, which may not be the case.

This project had several limitations. First, the women in this sample were all enrolled in prenatal care, and those in the HIV-infected sample were receiving at least some HIV care. We know very little about HIV-infected women who do not receive either prenatal care during pregnancy or HIV care; caution should be taken in generalizing these results to women not receiving prenatal care. Second, we conducted multiple comparisons as part of the data analyses for this study; therefore, we could expect to find significant statistical findings as a result of chance rather than truly observed relationships. Although, we found few statistically significant differences between the groups, results from multiple comparisons should always be interpreted with caution. Third, the HIV-infected group included women who were newly diagnosed as well as those who knew they were HIV-infected for longer periods of time; further research is necessary to identify the psychosocial risks of being diagnosed with HIV during pregnancy.

Despite these limitations, we see a number of strengths in this study. The inclusion of a matched comparison group is of particular note. To our knowledge, very few studies have allowed the examination of the effects of HIV separate from the stressors already affecting this vulnerable population. Given the demographic similarity to the larger population of women with HIV infection, the results are likely generalizable to the larger population of pregnant women with HIV and those most at risk. However, levels of stress, depressive symptoms, and behavioral risk may be even higher among women not in care, and more work is needed regarding these women.

The results of this study suggest that programs to identify HIV infection in pregnant women do not appear to increase psychosocial stress, at least during pregnancy. They also suggest that prevention efforts directed toward pregnant women should not only include efforts to prevent perinatal transmission but should also involve primary prevention for HIV-uninfected women. The level of ongoing HIV risk among the uninfected women in this study suggests such a need, as well as an opportunity for interven-

tion. The women in this study were all receiving prenatal care, which places them in continuing interaction with health care providers. This interaction may provide an important opportunity for risk reduction among uninfected women. In addition to prenatal screening and linkages to services for HIV-infected women, primary prevention efforts would avert infection among at-risk pregnant women as well as transmission to their infants. As we move further in our efforts to prevent perinatal transmission, it is important to continue our efforts to ensure that women who are uninfected have the necessary tools to remain so.

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