Published in final edited form as:

Int J Sex Health. 2010 ; 22(3): 195–204. doi:10.1080/19317611003800614.

Predictors of Sexual Behavior Among Early and Middle Adolescents Affected by Maternal HIV

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Abstract

The impact of maternal HIV and family variables on sexual behaviors of early and middle adolescents was investigated. Data were collected from 118 pairs of HIV-positive mothers and their uninfected early/middle adolescents across four time-points. Descriptive analyses show the prevalence of sexual behaviors in this sample was significantly lower than rates in a comparable sample of adolescents who participated in the Youth Risk Behavior Surveillance System. Multivariate longitudinal analysis using GEE logistic regression showed adolescent sexual behavior was more likely to occur with adolescent alcohol use, lack of parental monitoring, and poorer physical functioning of HIV+ mothers.

Keywords

HIV; Adolescent; Risk-Taking; Sexual Behavior

Children of HIV positive mothers often live with the same factors that placed the mothers at risk for HIV (Havens, Mellins, & Hunter, 2002; Mellins, Brackis-Cott, Dolezal, & Meyer-Bahlburg, 2005). Among adolescents and young adults in treatment for sexually acquired HIV, 19% reported having a parent(s) with HIV/AIDS (Chabon, Futterman, & Hoffman, 2001). Daughters of HIV positive mothers exhibited a high rate of early childbearing compared to national and local rates (May, Lester, Ilardi, & Rotheram-Borus, 2006) and an average sexual debut that was a full year earlier than normative (Lee, Lester, & Rotheram-Borus, 2002). A study of adolescent daughters of HIV-positive mothers (age 11 – 18) found that half initiated their sexual activities by age 14 years (Lee et al., 2002), which is early compared to national averages (Guttmacher Institute, 2006).

The current study examines rates of sexual behavior in a sample of early and middle adolescents whose mothers are HIV positive as compared to a sample of youth from the Youth Risk Behavior Surveillance System (YRBSS), a national school-based study designed to monitor priority health risk behaviors among youth (Eaton et al., 2008). This study also assesses the impact of maternal illness severity and family variables on sexual behaviors of early and middle adolescent children affected by maternal HIV. Currently there is little information on the impact of having a mother living with HIV (MLH) specific to early and

middle adolescence, particularly for African-Americans and Latinos. Early adolescence is a developmental period of rapid physical, psychological, sociocultural, and cognitive changes. One study compared early adolescent children (10 – 14 years old) of MLH with adolescents whose mothers did not have HIV and found low rates of intercourse consistent with national rates for that age group, and no significant differences in sexual behaviors between children of HIV negative and children of MLH (Mellins et al., 2005). The American Academy of Child and Adolescent Psychology and other research with adolescents has identified behaviors associated with early (12 – 14 yrs.) and middle (15 – 16 yrs.) adolescence, including: experimentation with tobacco, marijuana, and alcohol use; experimentation with body; the search for new people to love in addition to parents; and peer group influence (Super, 1990).

Stressful life events are often associated with higher rates of mental health symptoms and negative outcomes among teens, and chronic illness of a mother is a uniquely stressful life event. The lives of early adolescents of MLH are likely to have been under some stress for many years (Garnier & Weisner, 1994). MLH are more likely than HIV negative mothers to have clinical levels of depression (Brackis-Cott, Mellins, Dolezal, & Spiegel, 2007), increasing their children's risk for early sexual behavior and substance use initiation. Maternal risk behaviors such as use of alcohol, tobacco or drugs (Wilder & Watt, 2002) also have been linked to early sexual initiation on the part of adolescent children, and family structure has been shown to be significantly related to likelihood of early sexual initiation (French & Dishion, 2003).

A number of the theoretical models that link family characteristics and adolescent behaviors have emphasized the role of parental behavioral and family management as protective factors (Browning, Leventhal, & Brooks-Gunn, 2005; Stattin & Kerr, 2000) -- that is, factors that reduce or moderate the effect of exposure to risk factors. For example, a large body of research supports parental monitoring as a protective factor. Poor parental monitoring has been significantly associated with earlier sexual behavior initiation (Sieverding, Adler, Witt, & Ellen, 2005), risky sexual behavior (i.e., no condom use and more partners, Huebner & Howell, 2003) and sexually transmitted diseases (DiClemente et al., 2001), and alcohol use (Hayes, Smart, Toumbourou, & Sanson, 2004).

There is less research documenting the protective effects of family routines, but existing studies do show that higher scores on family routines measures are associated with lower levels of sexual intercourse (Denham, 2003). In families affected by maternal HIV, Murphy, Marelich, Herbeck, and Payne (2009) found that among families with more frequent family routines, adolescents showed lower rates of aggressive behavior, anxiety/worry, depressive symptoms, conduct disorder behaviors, and binge drinking, and exhibited increased self-concept. Better physical health among MLH was associated with more effective parenting skills.

The current study utilizes longitudinal data from adolescent/mother dyads to investigate the effects of maternal HIV and family variables on adolescent sexual behavior. The general prevalence of sexual behaviors and substance use are first provided. Next, bivariate and multivariate associations over time are evaluated between the protective and risk factors (including substance use) on sexual behavior, with a focus on evaluating the best predictors of adolescent sexual behavior.

Methods

Participants

The Parents and Adolescents Coping Together (PACT II) is a continuation of a longitudinal assessment study of 135 MLH and their well children age 6 – 11 conducted from 1997 to 2002 (Parents and Children Coping Together: PACT I) living in Los Angeles county. The PACT II study continued to follow 81 of the original families in the PACT study as the children transitioned to early and middle adolescence, and the original sample was supplemented with 37 new families, for a total of 118 families. Study participants met the following criteria: maternal HIV diagnosis, well-child (aged 10 – 17) living with the mother, informed consent/assent, and English or Spanish speaking. Medical chart abstraction confirmed maternal diagnosis and provided laboratory results for assessing maternal health. MLH and adolescents were interviewed at four time points: baseline (conducted from June 2003 to October 2004; $N = 118$), 6-month ($n = 112$), 12-month ($n = 106$) and 30-month follow up ($n = 94$). The retention rate at the 30-month follow-up was 80%. At this time point, 14 families were out of the country or could not be located; eight mothers were deceased (with guardian consent, three children whose mothers were deceased participated in the 30-month follow up); two mothers lost custody of their child; two mothers declined to participate; and one mother was incarcerated.

Mean age for MLH at baseline was 39.2 years ($SD = 5.8$; age range = 28 – 57), with 60% Latina, 28% African American, 5.1% White, 4.2% multiracial, and 2.5% other. Half (50%) had not completed high school; 21% had completed high school or received their GED; and 29% had some education beyond high school. About three-fourths (73.7%) had not worked in the last month, and 77.1% were not currently married. Most MLH were prescribed highly active antiretroviral therapy (78%). Based on medical chart abstractions, viral load (RNA copies per ml) was as follows: 59% had viral loads of 400 or less; 19% in the 401 – 10,000 range; 12% in the 10,001 – 50,000 range; and 10% over 50,000. Adolescents had a mean age of 13.0 ($SD = 1.8$; range = 10–17).

In order to assess whether PACT II adolescents of MLHs were engaging in sexual behavior and substance use at rates comparable to a sample of youth from a general adolescent population, data were compared with a sample of adolescents who participated in the Youth Risk Behavior Surveillance System (YRBSS), sponsored by the Centers for Disease Control and Prevention (CDC, 2004). Data from the 2007 Los Angeles County school-based YRBSS sample ($N = 1,118$) were compared with data from the 30-month time period of PACT II collected in 2006–2007. The PACT II and YRBSS samples were comparable on age, gender, ethnicity, geographic region and time point of data collection. YRBSS data are reported by grade level, so ages are based on average age for grade level, and for actual reported age in the PACT II study. YRBSS data consisted of adolescents in the 14–18 year age range, consequently, for comparative analyses between PACT II and YRBSS samples, the PACT II sample was restricted to adolescents age 14–18 years ($N = 76$) and categorized into 14, 15, 16, and 17–18 years (to correspond to grade level reported in YRBSS). The samples were found to be similar demographically. Chi-square tests indicate gender composition between the samples to be similar (PACT II [52% male and 48% female], YRBS [51% and 49%], $\chi^2 = 0.00$, n.s.), as is age ($\chi^2 = 5.05$, n.s.). However, some race/ethnicity differences are evident ($\chi^2 = 19.87$, $p < .001$). Although both samples are predominantly Latino, the samples differ in terms of African-American participants (29.7% in PACT II; 12% YRBSS), and white (14.4% in PACT II; 8.6% in YRBSS).

Procedures

Study procedures were approved by the Institutional Review Board at the University of California, Los Angeles. Participating MLH provided informed consent and adolescents provided assent. Trained bilingual interviewers conducted face-to-face interviews in the family's home. Interviews of mothers and adolescents were conducted separately using a computer-assisted interviewing program on laptop computers. MLH received \$35 for participation; adolescents received \$25.

Measures

Parenting Practices

Parental monitoring—The Parental Monitoring scale (Steinberg, Fletcher, & Darling, 1994) was adapted for the adolescents. Eleven items assessing the extent of parental knowledge of the child's whereabouts and extent of parental tracking were selected and administered to the adolescent (e.g., "Your mother knows where you go at night"; "If I am going to be home late, I am expected to call"). Higher scores indicate more parental monitoring. Cronbach's alpha for the sample is .84.

Family routines—A subset of eight questions from The Family Routines Questionnaire (Jensen, James, Boyce, & Hartnett, 1983) was administered to the MLH (e.g., "In our family, children go to bed at the same time each night"; "In our family, the whole family eats dinner together"). Cronbach's alpha for this sample was .81.

Maternal Assessment

Maternal physical health—Maternal physical health was assessed using several measures, including hospitalizations in the past six months, CD4 count and viral load (abstracted from medical records at baseline and 12 months), and the Medical Outcome Study Short Form 36 (MOS SF-36; Ware & Sherbourne, 1992). The higher the viral load and the lower the CD4 cell count, the more advanced the illness. Due to the skewed distribution of viral load, this variable was dichotomized based on a median split of the distribution of the data. For this study only the physical functioning subscale of the MOS SF-36 was utilized (higher scores indicate better functioning; Cronbach's alpha of .91).

Depression—The Hamilton Depression Inventory (Reynolds & Kobak, 1995), a measure of severity of adult depressive symptomatology, was administered. Cronbach's alpha for this study was .87.

Health-related anxiety—Four items assessed the mother's health-related anxiety within the past week: troubles with sleeping, eating, socializing and school/work activities in reaction to thinking about HIV/AIDS and health (e.g., "You were thinking about HIV infection/AIDS and your health, and because of that you had trouble concentrating at school or work because of worrying about your health"). For each item, the mother was asked to rate how often thinking about HIV infection/AIDS and her health affected that area of her life on a scale from 1 (not at all) to 5 (always). The scale has been previously utilized with an HIV-infected population, with good internal consistency reliability (Murphy, Steers, & Dello Stritto, 2001; Murphy, Wilson, Durako, Muenz, & Belzer, 2001). Cronbach's alpha for the current study was .87.

Substance use—A 15-item alcohol and drug assessment was administered, including questions on "ever used" and "used in the past three months" for alcohol, marijuana, cocaine, amphetamines and other illicit drugs. As an indication of heavy alcohol use, the mothers were asked how many times in the past three months they had five or more drinks

in one day. Only heavy alcohol use in the past three months and whether the mothers used marijuana in the past three months were examined in relation to adolescent sexual behavior in these analyses, given the low rates of other drug use.

Adolescent Assessment

Substance use—Items recommended by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and the Adolescent Trials Network survey of high-risk teens assessed alcohol and drug use among adolescents. For the present analyses, lifetime tobacco, alcohol and marijuana use were examined. Very low levels of other drug use were reported, therefore other substance use was not examined in these analyses. The adolescents were first asked, “In your whole lifetime, have you ever smoked a cigarette?” To assess alcohol and marijuana use, respondents were asked whether they ever had more than a few sips of alcohol, and whether they had ever smoked marijuana.

Sexual behavior—Progression of pre-sexual and sexual behaviors was assessed with 24 items from the Healthy Passages study (Windle et al., 2004). These items assessed whether the adolescent ever engaged in pre-sexual behaviors (e.g., holding hands/kissing), progressing through sexual touching (e.g., touching private parts, oral sex), and concluding with questions related to sexual intercourse.

For the initial analyses of adolescent sexuality, responses to the 24 items were separated into four categories: *none*, *holding hands/kissing*, *sexual touching/oral sex* (including touching under a boy or girl’s clothes, touching a boy or girl’s private parts, letting a boy or girl touch him/her in this way, oral sex) and *sexual intercourse*. To allow for comparisons of sexual behavior across the YRBSS and PACT II studies, adolescents who reported ever having sexual intercourse were compared to those who reported they never had intercourse.

Bivariate and multivariate analyses utilized a dichotomous outcome, contrasting no sexual activity or pre-sexual behaviors (none, holding hands/kissing) with sexual behaviors (sexual touching/oral sex, sexual intercourse).

Analysis

Descriptive statistics (means and percentages) are provided on measures of adolescent sexual behavior (i.e., sexual behavior categories) and substance use (cigarette, alcohol, and marijuana) for each time point. Both bivariate logistic regression and generalized estimating equation (GEE) logistic regression models are next provided to evaluate predictors of a dichotomized measure of adolescent sexual behavior, with demographic covariates included in the models. Separate bivariate logistic regression analyses within each time point were performed to assess associations of adolescent sexual behavior with maternal health (physical functioning, hospitalization, depression, health-related anxiety, and biomedical markers), maternal substance use (marijuana), parenting practices (parental monitoring and family routines), and youth substance use (cigarette, alcohol, marijuana). A GEE logistic regression model (Hoffmann, 2003) was then generated using SAS Proc Genmod to assess select predictors simultaneously across time in predicting adolescent sexual behavior.

Results

Adolescent Sexual Behaviors and Substance Use

Table 1 contains percentages of PACT II adolescents regarding the four sexual behavior categories (i.e., no sexual behavior, holding hands/kissing, sexual touching/oral sex, and sexual intercourse) for each time point. We also include in this table information on substance use. Only 8.5% of young adolescents engaged in sexual intercourse as reported at

the baseline interview when the mean age was 13 ($SD = 1.8$). This rate increased to 27.7% at the 30-month follow up when the adolescents' average age was 15.4 ($SD = 1.8$). Substance use also shows increases across the four time points.

Whether our sample is representative of adolescents more generally can be addressed through comparisons with the Los Angeles County YRBSS data (Centers for Disease Control and Prevention, 2008). Sexual intercourse and substance use prevalence comparisons between the two samples were evaluated using point estimates with 95% confidence intervals (YRBSS provided standard errors for these variables) within age categories (14, 15, 16, and 17–18) and in aggregate. In general, few differences were noted across the samples. The overall rate of sexual intercourse of PACT II adolescents (30%, 95% C.I. = 19.7 – 40.3) was significantly lower than the rate in the YRBSS sample, 46.4% (95% C.I. = 40.6 – 52.3). Among the youngest age group, adolescents in the PACT II sample had a lower rate of alcohol use (26.1%, 95% C.I. = 8.2 – 44.0) compared to 65.6% (95% C.I. = 55.0 – 74.9) in the YRBSS sample. No other differences were noted.

Protective and Risk Factors Associated with Adolescent Sexual Behavior

Bivariate logistic regression was performed using a dichotomized measure of adolescent sexual behavior (no sexual activity or pre-sexual behaviors vs. sexual behaviors) as the outcome at each of the four survey time points. Individual models were evaluated for each of the maternal health, maternal substance use, parenting practice, and adolescent substance use measures at each time point. Adolescent age, gender, and two race/ethnicity dummy variables (Latino/non-Latino and Black/non-Black) were included as covariates in the models.

Table 2 contains the final parameter estimates for each of the variables excluding the covariate estimates. (Covariates in all models were significant at $p < .10$, indicating that older adolescents, males, and those reporting Black or Latino race/ethnicity have a greater likelihood of sexual behaviors) Significant findings were noted in the 30-month follow-up, suggesting poorer maternal physical functioning, lower parental monitoring, and adolescent alcohol and marijuana use are predictive of sexual behaviors. In addition, lower parental monitoring and adolescent alcohol use consistently predicted sexual behaviors across time.

A generalized estimating equation (GEE) logistic regression model was next used to evaluate predictors of adolescent sexual behavior to account for the longitudinal nature of the data and evaluate multiple predictors simultaneously (Hoffmann, 2003). As with the prior bivariate logistic regression models, the dichotomized measure of sexual behavior (none/pre-sexual behaviors vs. sexual behaviors) was the outcome. Predictor variables included were those found significant in the logistic regression analyses. Adolescent age, gender, and two race/ethnicity dummy variables (Latino/non-Latino and Black/non-Black) were also included in the model. For the GEE model, an independent covariance structure was specified. However, we report the robust standard errors and parameter estimates which account for the correlated nature of the data since the GEE method makes adjustments “using the empirical dependence the actual data exhibit” (Agresti, 2007, p. 281), and derives reasonable estimates regardless of the underlying structure.

The GEE results are noted in Table 3. Older adolescents, males, and those reporting Black or Latino race/ethnicity reported a greater likelihood of sexual behaviors (similar to the bivariate logistic regression models). Adolescent alcohol use was also a significant predictor, with alcohol use associated with a greater likelihood of sexual behaviors. Parental monitoring was found to be a significant predictor, with higher levels of parental monitoring leading to a *reduced* likelihood of sexual behaviors. A significant interaction of time and maternal physical functioning is also noted. Assessment of trajectories suggest adolescents

of mothers reporting lower levels of physical functioning show greater rates of increase in sexual behaviors over time compared to adolescents of mothers reporting higher levels of physical functioning.

Discussion

As would be expected from a developmental perspective, adolescents' rates of engaging in sexual intercourse increased with age, from less than 10% at baseline when the mean age was 13, to just over 25% at the 30-month interview for the entire sample when the mean age was 15.4. However, the PACT II rate of sexual intercourse (30% among youth aged 14 – 18) was *lower* than that noted in the YRBSS general population survey for Los Angeles adolescents (46%). Although some studies have associated having an HIV+ parent with early sexual debut and greater sexual risk among their children (Lee et al., 2002; May et al., 2006), other research indicates adolescent age of initiating sexual activity and rates of sexual activity were not related to parental HIV status (Leonard, Gwadz, Cleland, Vekaria, & Ferns, 2008).

Regarding this sample in comparison to the Los Angeles County YRBSS, some studies suggest MLH are more likely to discuss HIV with their early adolescent children compared to HIV- mothers (O'Sullivan, Dolezal, Brackis-Cott, Traeger, & Mellins, 2005); and maternal communication about sexual risk has been associated with decreased sexual risk behavior (Hutchinson, Jemmott, & Jemmott, 2000). Accordingly, MLHs' own experience with the disease may influence the quality and the frequency of their discussions with their adolescents about sexuality, which in turn may support adolescents' decisions and behaviors to delay sexual activity. In addition, studies showing an association of sexual risk with maternal HIV have been reported for older adolescents. This was an early/middle adolescent sample. Our sample has been followed from an early age, and many knew their mother's HIV status from a young age (Murphy, 2008). Level of child resiliency may result in different reactions to maternal disclosure of HIV and may vary by age (Murphy & Marelich, 2008). Thus, how open the children are to maternal messages regarding safe sex may be somewhat dependent on when they learn of their mother's serostatus, and how they cope with the disclosure. Further work in this age group with heterogeneous samples (e.g., different geographical areas, ethnicities) is needed to further explore these issues.

Of particular import is the finding (from both the bivariate and GEE logistic regression models) that increased parental monitoring was associated with lower levels of sexual activity, agreeing with past research (Cottrell et al., 2003; Richards, Miller, O'Donnell, Wasserman, & Colder, 2004). Given that parental monitoring consistently remained a protective factor over the course of the study, family interventions that emphasize ongoing parental monitoring throughout this developmental period may be particularly helpful in lowering early/middle adolescent sexual behaviors.

Another important finding from the current study is that MLH health status was a strong determinant of adolescent sexual behavior. Trajectories indicate poorer maternal physical functioning associated with increased sexual behavior over time. MLH limiting their daily activities for health reasons may contribute to higher adolescent responsibility-taking (Murphy, Greenwell, Resell, Brecht, & Schuster, 2008), which may increase stress on early/middle adolescents. Most of the families in the present study have lived with HIV/AIDS for many years, and at this developmental period, adolescents may be adversely affected by having a MLH whose physical functioning is limited, and/or has remained limited over several years. It is common for early/middle adolescents to begin to separate from parents and increase attachments with peers; however, if the adolescent fears the imminent loss of a parent, s/he may feel compelled to rely on peers and boyfriends/girlfriends for support

earlier than adolescents of healthier mothers. Additionally, for MLH, parenting skills, particularly parental monitoring, may become increasingly difficult to maintain when physical functioning is declining.

This study has several limitations. First, small sample sizes by age group for the PACT II adolescents limit the extent that conclusions can be drawn regarding differences in rates of sexual intercourse by age in the PACT II and YRBSS samples. Although the 15 and 16 year old age groups appear to show the largest differences in rates of sexual intercourse, the wide confidence intervals necessitate caution in interpreting results. Another limitation regards the measure of adolescent sexuality. Although we captured information on pre-sexual and sexual intercourse, these were evaluated in aggregate; the use of such summary categories can lead to a loss of information.

The current findings are consistent with previous research indicating that parenting practices (Crosby, DiClemente, Wingood, Lang, & Harrington, 2003) and adolescent alcohol use--particularly among younger adolescents (Fergusson & Lynskey, 1996), are associated with adolescent sexual behavior. In this regard, risk and protective factors for adolescents affected by maternal HIV were similar compared to youth in general populations; however, early/middle adolescents of MLH in this sample exhibited a lower rate of sexual behavior.

Acknowledgments

This research was supported by Grant Number 5R01MH057207 from the National Institute of Mental Health to the first author.

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Table 1

Percentage of adolescents reporting pre-sexual and sexual behaviors^a and substance use across time

	Baseline N = 118	6-month follow-up N = 112	12-month follow-up N = 106	30 month follow-up N = 94
Mean age (SD)	13.0 (1.8)	13.5 (1.8)	14.0 (1.8)	15.4 (1.8)
<i>Sexual behavior</i>				
None	39.0	30.4	21.7	11.7
Holding hands/kissing	42.4	44.6	50.0	50.0
Sexual touching/oral sex	10.2	14.3	16.0	10.6
Sexual Intercourse	8.5	10.7	12.3	27.7
<i>Substance use</i>				
Cigarette	22.9	31.2	34.6	41.5
Alcohol	24.6	32.1	41.1	55.3
Marijuana	16.1	21.4	24.3	33.0

^aThe sexual behavior measure is summarized into four categories: no sexual behavior, holding hands/kissing, sexual touching/oral sex, and sexual intercourse. Vaginal and anal intercourse were not differentiated in the measure. Responses above are not inclusive of higher-level responses (for example, although responding "yes" to sexual intercourse would naturally be inclusive of sexual touching, it is not reflected in the reported percentages).

Table 2

Bivariate logistic regression models predicting adolescent sexual behavior^a from maternal health, maternal substance use, parenting practices, and adolescent substance use measures with adolescent age, gender, and race/ethnicity as covariates (separate models presented for each measure within each time period)

Predictor Variables	Baseline Models		6 month Models		12 month Models		30 month Models	
	Estimate (SE)	p	Estimate (SE)	p	Estimate (SE)	p	Estimate (SE)	p
<i>Maternal Health</i>								
Physical functioning	-.02 (.02)	.20	.01 (.01)	.35	.00 (.01)	.92	-.03 (.01)	<.01
Hospitalization	.04 (1.23)	.97	-.20 (.99)	.99	-.56 (.88)	.53	1.03 (.86)	.23
Depression	.09 (.05)	.09	.01 (.04)	.81	.04 (.03)	.22	.06 (.04)	.11
Health-related anxiety	.03 (.15)	.85	.17 (.10)	.08	.09 (.06)	.16	.06 (.09)	.50
CD4 ^b	.00 (.002)	.21	--	--	.00 (.001)	.37	--	--
Viral Load ^b	.22 (.83)	.80	--	--	-.39 (.66)	.56	--	--
Maternal marijuana use	2.66 (1.54)	.08	.03 (.64)	.97	1.20 (.93)	.19	.40 (.86)	.64
<i>Parenting Practices</i>								
Parental Monitoring	-1.59 (.66)	<.05	-1.03 (.45)	<.05	-1.61 (.50)	<.01	-.87 (.39)	<.05
Family Routines	-.10 (.09)	.26	-.08 (.06)	.17	-.07 (.05)	.19	-.07 (.06)	.26
<i>Adolescent Substance Use</i>								
Tobacco use	1.22 (1.03)	.23	.98 (.67)	.14	1.08 (.61)	.07	1.21 (.53)	<.05
Cigarette use	2.85 (1.21)	<.05	2.88 (.78)	<.001	2.94 (.74)	<.001	1.69 (.60)	<.01
Marijuana use	.73 (.94)	.44	.28 (.68)	.67	.58 (.61)	.34	1.48 (.57)	<.01

^a Analyses reflect a dichotomous outcome: no sexual activity/pre-sexual behaviors (none, holding hands/kissing) vs. sexual behaviors (sexual touching/oral sex, sexual intercourse).

^b CD4 and Viral Load only available for baseline and 12-month follow-up.

Note: Covariate findings for models are not shown. In all models, covariates were significant at $p < .10$.

Table 3

GEE logistic regression results predicting adolescent sexual behavior^a from select maternal health, maternal substance use, parenting practices, and adolescent substance use measures, adolescent demographics, and time.

	Estimate	SE	Z value	p=
Adolescent age	0.88	0.19	4.76	< .0001
Adolescent gender (female)	-2.05	0.64	-3.19	0.0014
Adolescent race (Black)	4.76	1.34	3.56	0.0004
Adolescent ethnicity (Latino)	4.30	1.22	3.52	0.0004
Maternal physical functioning	0.00	0.01	-0.01	0.9925
Parental monitoring	-0.99	0.35	-2.82	0.0048
Cigarette use	-0.18	0.64	-0.28	0.7826
Adolescent alcohol use	2.59	0.72	3.59	0.0003
Adolescent marijuana use	-1.04	0.76	-1.37	0.1705
Time	-0.01	0.69	-0.02	0.9860
Race by time	-0.15	0.33	-0.45	0.6535
Ethnicity by time	0.07	0.28	0.25	0.7998
Maternal physical functioning by time	-0.01	0.003	-2.37	0.0180
Parental monitoring by time	0.09	0.13	0.73	0.4626
Cigarette use by time	0.08	0.18	0.46	0.6424
Adolescent alcohol use by time	-0.15	0.20	-0.75	0.4546
Adolescent marijuana use by time	0.30	0.17	1.76	0.0788

Note: Total number of observations: $N = 423$.

^a Analyses reflect a dichotomous outcome: no sexual activity/pre-sexual behaviors (none, holding hands/kissing) vs. sexual behaviors (sexual touching/oral sex, sexual intercourse).