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Career readiness and externalizing behaviors of children affected by maternal HIV/AIDS: 15-year outcomes of the PACT study

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Abstract

The purpose of this 15-year longitudinal study was to assess the effects of maternal HIV/AIDS on child/adolescent career readiness and externalizing behaviors. Interviews were conducted with 66 pairs of healthy children and their mothers living with HIV/AIDS (MLH), who are participants in the Parents And children Coping Together (PACT) project begun in 1997. All study participants were English or Spanish speaking. About half (48.5%) of the youth were female. Maternal health status (e.g., viral load biomedical marker, illness symptoms, physical functioning and depression) and child/adolescent outcomes (e.g., career readiness, conduct disorder, drug use, sexual behaviors, parent attachment and youth autonomy) were assessed over 20 time-points. Individual growth and GEE logistic regression models showed lower variability in maternal viral load was positively associated with better career readiness and parent attachment among adolescent/young adults. Externalizing behaviors (conduct disorder, alcohol and crystal methamphetamine use) were positively associated with maternal depression. Adolescent coping efficacy was shown to be a protective factor when applied to models on career readiness. Stability in MLH health positively affects children's career readiness over time, particularly career planning and career choices. The finding that adolescent coping efficacy may act as a protective factor against poor career planning has important implications for developing interventions to assist children in coping with parental HIV.

Keywords

HIV; Longitudinal Studies; Child Behavior; Child Development; Adolescent Behavior; Adolescent Development

The purpose of the current study is to longitudinally assess adolescent career readiness and externalizing outcomes in children affected by maternal HIV using data from the final waves

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Declaration of Conflicting Interests

The authors declare that there is no conflict of interest.

of the Parents and Adolescents Coping Together studies (PACT; NIMH, etc.). Factors related to psychosocial outcomes among children affected by parental HIV have been laid out in an empirical model (Murphy, Marelich, Hoffman, & Schuster, 2006), with parental health a main factor in the model. Most studies have found that such children have more difficulties in all domains of psychosocial adjustment (Bauman, Silver, Draimin, & Hudis, 2007; Chi & Li, 2013; Murphy & Marelich, 2008), however, the quality of the mother-child relationships is an important factor affecting child psychosocial outcomes (Kotchick et al., 1997).

Many investigations of child internalizing outcomes have been conducted (Forehand et al., 2002; Reyland, McMahon, Higgins-Delessandro, & Luthar, 2002). The 15-year Parents and Adolescents Coping Together III study (PACT III; National Institute of Mental Health) was a continuation of two longitudinal studies (PACT and PACT II) assessing mothers living with HIV/AIDS (MLH) and their well children. The original Parents And children Coping Together (PACT) study followed a sample of 135 families every six months beginning in 1997 when the children were age 5 – 11. PACT II followed the families as the children transitioned to early and middle adolescence. PACT III continued as the children transitioned to late adolescence/early adulthood. A longitudinal study on the psychological well being of the PACT young children ($M_{age} = 8.8$ years; study conducted over 6 years) and association with mothers' health was conducted (Murphy, Greenwell, Mouttapa, Brecht, & Schuster, 2006). Individual growth models showed lower levels of physical functioning and more symptoms among mothers were associated with higher levels of children's depression, anxiety, and aggressiveness at baseline. They were also associated with initially high but more rapidly decreasing levels of depression among children. Stability in mothers' health was associated with more rapid improvement in children's mental health over time.

A second study conducted when PACT children were late adolescents/early adults (Murphy, Marelich, & Herbeck, 2012) was consistent with earlier findings: poorer maternal health and increased maternal health-related anxiety were associated with child depression, and an increase in maternal illness was associated with child anxiety. There was strong evidence that younger children are more impacted by poor maternal health than were older children/adolescents.

Confirming PACT findings, in a recent review on mental health in children and adolescents affected by HIV/AIDS children demonstrated elevated rates of psychological distress compared with non-HIV-affected controls (Betancourt, Meyers-Ohki, Charrow, & Hansen, 2013). Positive parenting and support were associated with resilient outcomes in the children.

Maternal HIV/AIDS: Associations with Career Readiness and Externalizing Behaviors

Career Readiness

Extremely little research has been conducted on children affected by maternal HIV/AIDS and career readiness, including academic outcomes. Such children are likely to have poorer

grades than children of non-infected mothers (Biggar et al., 2000). In a review of 23 studies worldwide, educational disadvantages were found (Guo, Li, & Sherr, 2012). To our knowledge, this would be the first study prospectively investigating career readiness and planning among children affected by HIV/AIDS.

Externalizing Behaviors

On the other hand, a great deal of research has been conducted on externalizing behaviors among children affected by maternal HIV/AIDS. For adolescents, risks include pressure to drop out of school for sick parents (Betancourt et al., 2013) or to earn money (Cluver, Gardner, & Operario, 2008), with those children taking on adult responsibility (“parentification”). Another concern is drug and alcohol use. Poorer family functioning has been affiliated with substance use among early adolescents with an HIV-infected parent (Rosenblum et al., 2005).

An early article reported an ascending linear trend for child reported externalizing problems from the mothers’ non-infected stage through increasingly severe stages of HIV-infection (Dorsey et al., 1999). In another study, children were significantly less well adjusted on Child Behavior Check List scores than children in a normative sample, having scores similar to children referred for an outpatient clinic (Hough, Brumitt, Templin, Saltz, & Mood, 2003). The mother-child relationship may affect this (Jones, Foster, Zalot, Chester, & King, 2007).

Among early adolescents affected by maternal HIV compared to adolescents of uninfected mothers, maternal HIV status did not significantly add to their engagement in high-risk sexual behaviors (Mellins, Brackis-Cott, Dolezal, & Meyer-Bahlburg, 2005). And while many youth were using alcohol, maternal HIV was not a significant influencing factor. Similarly, Mellins et al. (2007) found that while marijuana and alcohol use increased over time, maternal HIV status was not associated with risk behavior outcomes. However, Rosenblum et al. (2005) found that among youth in HIV-affected families, poorer family functioning predicted substance use.

Purpose of the Current Paper

The current paper is a new study following earlier PACT longitudinal papers. (Murphy et al., 2006; Murphy, Marelich, & Herbeck, 2012) In the current study, we extend the time-span to the final 15th year (using data from PACT I, PACT II, and PACT III), with a focus on career readiness and externalizing outcomes. This study adds to the literature, in that it is the first study investigating child/adolescent career readiness among children affected by maternal HIV/AIDS, and externalizing behaviors, over such an extended age range.

Methods

Participants

Data are from a 15-year longitudinal study, Parents and Children Coping Together (PACT), which followed a sample of 135 mothers living with HIV/AIDS (MLH) and their children every 6 months beginning in 1997 when the children were age 5 – 11. In 2002, PACT II

continued to follow 81 of the original families and 37 new families ($N = 118$) every 6 months. Beginning in 2008, PACT III followed 96 families (95 youth and 88 MLH) from PACT II. The current analysis includes families ($N = 66$) who participated in PACT, II and III. Data were collected at 20 time points over 15 years. All study participants were English or Spanish speaking. Mothers were recruited from primary care sites and AIDS service organizations in Los Angeles County. Medical chart abstraction was conducted to verify eligibility, confirm diagnosis, and obtain CD4 count and viral load. Mothers' mean age at baseline was 34.9 ($SD = 5.9$); 53% were Latina, 33% African American, 8% White and 6% other/multiracial; 48.5% of the youth were female. The mean age of the children in this sample was 8.17 years ($SD = 1.86$) at PACT I baseline, and 20.81 years ($SD = 1.93$) at the PACT III 36-month follow-up interview.

Procedures

MLH and youth who agreed to participate provided signed informed consent; youth age < 18 provided signed assent. Trained bilingual interviewers conducted face-to-face interviews of mothers and youth separately in the family's home using a computer-assisted interview program on laptop computers. Mother interviews lasted 45 – 60 minutes and they received \$25 – \$35; youth interviews lasted 45 – 75 minutes and they received toys/gift cards in PACT, and \$25 – \$35 in PACT II and III. The Institutional Review Board at the University of California, Los Angeles, approved the study. The study was compliant with the Health Insurance Portability and Accountability Act of 1996 (HIPAA).

Measures – Model Covariates

Maternal physical and mental health stability—Maternal physical and mental health measures included self-reported viral load, the Medical Outcome Study (MOS) Short Form 36, and the Hamilton Depression Inventory (HDI). For this analysis, each time-point in PACT and PACT II were utilized (13 time-points). The MOS physical functioning subscale assessed the extent to which one's current health limits activities (Ware & Sherbourne, 1992); Cronbach's $\alpha = .87$. The 23-item HDI (Reynolds & Kobak, 1995) assessed severity of depressive symptomatology; α for this sample = .90.

The measures above were subsequently transformed into stability measures, allowing us to assess the question, "Do adolescents whose mothers have more stability in physical and mental health (i.e., levels of depression, viral load, and/or physical functioning, regardless of elevation, vary little across time) exhibit better youth outcomes, including higher levels of career readiness, fewer issues with conduct disorders and drug use, show better autonomy and attachment, and exhibit less sexual acting out?" Variability in these measures was derived by calculating standard deviations across the PACT I and PACT II time-points for each study participant.

Youth Outcome Measures

Career readiness—The Career Development Inventory (Savickas & Hartung, 1996; Super, Thompson, Lindeman, Jordaan, & Myers, 1981) assessed youth readiness to make educational and vocational choices based on knowledge of preferred occupation. The scale has an overall score (Cronbach's $\alpha = .95$), and two subscales measures of the extent of youth

career planning ($\alpha = .94$) and knowledge of future occupation ($\alpha = .93$). The Expectations for Success subscale of Jessor's Health Behavior Questionnaire (Jessor, Donovan, & Costa, 1991) was administered; α for this sample was .90. These were administered at 7 time-points in PACT III.

Conduct disorder and substance use—Conduct disorder and substance use were assessed at 7 time-points in PACT III. Conduct disorder was assessed using items from the NICHD Adolescent Trials Network. Higher scores indicate greater involvement in delinquent acts; α for this sample = .86. The Alcohol Use Disorders Identification Test (AUDIT) assessed youth alcohol use (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993); higher scores indicate more problematic alcohol use (Cronbach's $\alpha = .87$). To assess other drug use, items from the Adolescent Trials Network survey were used.

Closeness and parent attachment—Youth reported closeness and attachment to his/her mother at seven time-points in PACT III.

Autonomy—The Autonomous Functioning Checklist (AFC) (Sigafos, Feinstein, Damond, & Reiss, 1988) is a parent-completed checklist measuring autonomy in four areas: Self and Family Care; Management Activity; Recreational Activity; and Social and Vocational Activity. Cronbach's alphas for the current sample are: .91, .86, .76; and .77, respectively.

Sexual behaviors—Sexual behavior was assessed with items from the Healthy Passages study (Windle et al., 2004) at seven time-points in PACT III. Sexually active youth were asked whether they had vaginal sexual intercourse and whether they had oral sex in the past 3 months, and asked to report number lifetime partners.

Analysis

For longitudinal analyses with continuous outcomes, individual growth models were utilized (Singer & Willett, 2003), while for dichotomous outcomes, generalized estimating equations (GEE) logistic regression models were evaluated (Hoffmann, 2003). SAS Proc Mixed (v. 9.3) was used for continuous outcome analyses with restricted maximum likelihood, and SAS Proc GENMOD was used for the dichotomous outcome analyses. For both types of analyses, an auto-regressive covariance structure known as AR(1) was applied.

Models presented include both individual growth and GEE logistic regression. Along with time as a fixed-effect covariate with random intercepts and slopes, centered time-invariant covariates were utilized, including adolescent/young adult gender, and maternal stability variables representing variability of maternal viral load count, depression (HDI), and MOS physical functioning across PACT I and PACT II (based on standard deviations). All adolescent/young adult outcomes were treated as time-varying across the PACT III assessment. In essence, time-invariant covariates based on standard deviations across PACT I and PACT II, and gender, were used to predict time-varying adolescent/young adult outcomes across PACT III. Assessment wave from PACT III was used as the time effect.

Results

For PACT III adolescent outcomes, baseline means and standard deviations are noted in Table 1.

For the conditional growth and GEE logistic regression models (see Tables 2 and 3 for model results), significance tests are provided for the model intercepts, but are not interpreted. As noted earlier, the maternal health stability variables used as model covariates are represented as standard deviations of each variable across PACT I and PACT II (depression, viral load count, and physical functioning).

Career Readiness

For the career variable, variability of maternal viral load across PACT I/II was significant, with lower variability associated with better career choices for adolescents across PACT III (see Table 2). Regarding career plans, lower variability in maternal viral load count across PACT I/II was significantly related to better planning in adolescents across PACT III.

Exploratory analyses were next performed to investigate the individual CDI career items at PACT III baseline (cohort mean age of 18.26) and 18-month follow-up (cohort mean age of 19.72), focusing further on the effects of variability in maternal viral load. Groups of adolescents where maternal viral load showed extreme variability were compared to those with more stability across PACT I/II (the 75th percentile in the viral load variability item was used to form the two groups). Items at baseline addressing school and education were expected to show group differences since the cohort at baseline was finishing or had just finished high school, while items at 18-month follow-up addressing job and occupation planning were expected to show differences since the cohort had moved into the work-force or higher education settings.

Table 4 contains independent samples t-test results at baseline, and at 18-month follow-up. At baseline, the group whose mothers had more stable viral loads reported greater school and career planning/preparation compared to the group where variability was more extreme (e.g., “Talking about career plans with an adult who knows something about me”, “Getting a part-time or summer job which will help me decide”). At 18-month follow-up, adolescents whose mothers had more stable viral loads reported greater activity in job and occupational planning compared to those with more extreme variability (e.g., “The abilities needed for the occupation”, “Working conditions on such jobs”, “The chances for advancing in that kind of job or occupation”).

Conduct Disorder and Substance Use

For conduct disorders, two covariates were found to be significant; time and the Hamilton Depression Inventory (HDI). Regarding time, a linear increase in conduct disorders was noted for adolescents over PACT III. In addition, greater variability in maternal depression over PACT I/II was associated with more conduct disorders in adolescents across PACT III.

For alcohol use, both the HDI and MOS physical functioning covariates were significant. Greater variability in maternal depression across PACT I/II was associated with more

alcohol use in adolescents across PACT III. In addition, less variability in maternal physical functioning across PACT I/II was associated with more alcohol use in adolescents.

GEE logistic regression was used to evaluate marijuana and crystal methamphetamine outcomes (see Table 3). For marijuana use, findings showed a significant time effect; across PACT III, a linear increase in marijuana use by adolescents was noted. For crystal methamphetamine use, both significant time and maternal depression effects were noted; across PACT III, a linear increase in crystal methamphetamine was evident for adolescents, and greater variability in maternal depression over PACT I/II was associated with greater crystal methamphetamine use.

Closeness and Parent Attachment

For the closeness outcome, growth curve results showed a significant time effect; across PACT III, adolescents reported a linear decline in closeness. Regarding how well adolescents got along with their guardian/mother, variability in maternal viral load was found to have a significant association, with lower variability in maternal viral load count across PACT I/II being associated with adolescents getting along better with their parent/guardian across PACT III.

Autonomy

Various subscales of the Autonomous Functioning Checklist (AFC) evidenced significant findings. For the AFC self and family care outcome, both time and HDI were found to be significant predictors. Across PACT III, there was a linear increase in self and family care for adolescents. In addition, greater variability in maternal depression across PACT I/II was associated with more self and family care for adolescents across PACT III. For AFC management activity, a similar pattern of results was noted, with a linear increase across PACT III noted, and greater variability in maternal depression being associated with more management activity for adolescents.

For both AFC recreational activity and social vocational activity outcomes, HDI was the only significant covariate. Greater variability in maternal depression across PACT I/II was associated with more recreational activity, and social/vocational activity, for adolescents across PACT III.

Sexual Behaviors

For vaginal and oral sex, GEE logistic regression analyses were used (see Table 3). Both outcomes evidenced a significant time effect (a linear increase in these behaviors over PACT III), but no other covariates were significant at the .05 level.

Career Readiness and Coping Efficacy

Additional analyses were performed to further investigate the career findings. We evaluated whether adolescent/young adult coping might serve as a protective factor for career readiness by adding a coping efficacy covariate assessed during PACT III to the career growth models. The General Coping Efficacy scale (Sandler, Tein, & West, 1994) was administered to adolescents at each PACT III time point.¹

Across the career outcome measures (see Table 5 for model parameters), adolescent coping efficacy was found to be positively associated with better career readiness, including career choices, plans, and knowledge, with higher expectations for success. In addition, for models addressing career readiness and plans, variability in maternal viral load was again found significant, with lower variability in maternal viral load across PACT I/II associated with better adolescent career readiness and career planning in PACT III. Overall, these results are suggestive that coping efficacy is a contributing factor to adolescent career readiness. Further, for specific career readiness (career choice, career planning), coping efficacy may have a partial mediation effect (James, Mulaik, & Brett, 2006).

Discussion

The more stable MLH's health, the better career planning and career choices were made by their late adolescent/early adult children. This is a critical piece of information. The majority of studies on child outcomes have been useful in interventions for MLH in getting them to recognize that their medication and appointment adherence—and thus their health outcomes—have a large influence on immediate or close-in-time child outcomes, such as anxiety and depression. In a recent study of an intervention to improve MLH parenting and self-care results showed significant effects for improving parenting practices and self-care skills (unpublished findings currently in submission), and thus improved child self-concept, the parent-child relationship, and parent-child communication. This study reinforces findings such as those, but goes on to show the very long-term consequences of MLH self-care behaviors on later adolescent/young adult long-term outcomes.

In the current study, MLH health stability across time when children were 5 – 11 and 11 – 14 had a long-term impact on outcomes at late adolescence/early adulthood. As the adolescents approached age 19 – 19 1/2, those who had a mother with more stable health when they were younger were more accurately aware of actual job responsibilities, and to be able to plan the education and/or skills they would need for the position of interest to them (see Table 4).

In terms of externalizing behaviors, this study confirms and extends previous findings in the general population and in HIV-affected populations: mothers' depression is associated with more problematic externalizing behaviors, including delinquent behaviors and alcohol and methamphetamine use. There was one confusing finding: more stable maternal functioning was associated with more alcohol use. Further investigated showed alcohol use did not meet the cutoff for problem drinking, thus, this could simply be a statistical artifact. Alternatively, another possible interpretation is that some alcohol use among older adolescents is normative developmentally, and could be indicative of positive social adjustment.

Time effects for sexual behavior would be expected (and were found), as adolescents age developmentally and experiment with their bodies and with relationships. Although not noted in the Results because they did not meet .05 significance, there was a trend at the .10

¹Four items assessed perceived efficacy of coping: making them feel better; the degree to which they were satisfied with strategies employed; how well they felt they handled their problems compared to other kids; and how well they thought they would cope in the future. Higher scores indicated higher efficacy (Cronbach's α for this sample = .78).

level for greater maternal depression variability to be associated with more sex partners among the adolescents, and at the .07 level regarding greater maternal physical functioning variability and increased vaginal sex. This may in part be due to the fact that MLH experiencing more health problems are less likely to be able to engage in appropriate parental monitoring or maintain family routines (Murphy, Marelich, Herbeck, & Payne, 2009). In a previous study of the pregnancy rate among this sample, 31% of adolescents became pregnant or got someone pregnant over a 3-year period (49 live births, miscarriages, abortions, or pregnant at interview), and pregnancy was associated with less parental monitoring, family cohesion, and fewer family routines (Murphy, Marelich, Roberts, & Herbeck, 2012).

As noted in the Results, after review of analyses we wondered after the fact if child coping could mitigate some of the findings. Subsequent follow-up analyses showed child coping to be associated with better career readiness. The follow-up career analyses were suggestive of a partial mediation effect of coping efficacy. Successful adaptation to stress includes the ways in which individuals manage emotions, think constructively, regulate and direct behavior, control autonomic arousal, and act on social and nonsocial environments to alter or decrease sources of stress (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). There is substantial evidence that coping and self-concept are important for developmental adjustment. Coping skills reduce child vulnerability to problem behavior, such as aggression. Over time, the process of developing coping strategies and implementing these strategies across various situations leads to a sense of coping efficacy. Sandler defined coping efficacy as a belief that one can deal with demands made and the emotions aroused by a situation (Sandler, Tein, Mehta, Wolchik, & Ayers, 2000), and that it includes the belief that one has dealt well with stressors in the past and can deal effectively with stressors one is likely to encounter in the future.

In this study, while children of MLH may be at risk for poorer career planning—particularly as MLH disease status progresses—their coping skills may serve as a protective factor against this risk. Coping skills can be taught, especially if the mother serves as a good role model in terms of parent-child communication (Pedro-Carroll, Sutton, & Wyman, 1999; Wolchik et al., 2002).

Children of MLH have been largely ignored in the HIV and mental health research agenda. Hawk's (2007) review called for identifying ways to improve follow-up for children affected by maternal HIV. In a Cochrane Collaboration review, King, De Silva, Stein, & Patel (2009) found no studies of interventions for improving the psychosocial well-being of school age children affected by HIV/AIDS—and they included psychological therapy, psychosocial support and/or care, medical and social interventions. It is important to develop evidence-informed interventions to assist children in coping with parental HIV infection in a developmentally appropriate way. Hopefully, studies such as these—which bring to light some of the protective and risk factors among these families—will assist in this effort.

Despite the contributions this study makes to the literature, there are several limitations that require mention. While the career analysis variables were assessed at later multiple time

points, they only appeared in the PACT III assessment. Thus, it is not known how if these findings would be affected by a full longitudinal assessment of career aspirations.

There was a statistically significant relationship between maternal health variability and career analysis; however, this study was not able to account for other factors such as self-efficacy that may have contributed to children's career planning and readiness. Research suggests that self-efficacy among adolescents impacts later career aspirations in young adulthood (Bandura, Barbaranelli, Caprara, & Pastorelli, 2001). Further, community level factors such as neighborhood socio-economic status and unemployment rates may have an indirect affect on children's career aspirations. Measuring macro-level factors was beyond the scope of the current study.

Lastly, while the goal of this paper was to explore the effect of HIV+ mothers' illness on well children's career aspirations, the study lacked a control group in which to compare the findings. Outcomes of comparing children of HIV+ and HIV- mothers may highlight additional contextual factors (e.g., HIV stigma) that could impact children's career aspirations.

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Table 1

Observed Means and Standard Deviations of Outcome Variables for Adolescents/Young Adults, PACT III Baseline

Outcome Measures	<i>M</i>	<i>SD</i>
Career readiness		
CDI (Total)	61.22	15.98
CDI (Plan)	30.00	10.95
CDI (Knowledge)	31.22	7.54
Expectation for Success	43.42	5.22
Conduct Disorder and Substance Use		
Conduct Disorders	2.94	2.70
Alcohol Use (AUDIT)	4.44	6.37
Ever Marijuana Use ^a	0.55	0.50
Ever Crystal Methamphetamine Use ^a	0.13	0.33
Sexual Behaviors		
Lifetime Number of Sexual Partners	3.22	5.87
Vaginal Sex Past 3-Months ^a	0.47	0.50
Oral Sex Past 3-Months ^a	0.25	0.44
Closeness and Parental Attachment		
Close MOM	1.38	0.67
Got Along	2.03	1.14
Autonomy		
AFC Self-Family Care	49.38	18.03
AFC Management Activity	53.11	15.67
AFC Recreational Activity	41.05	12.49
AFC Social Vocational Activity	13.38	3.94

Note: Mean average age of participants (PACT III Baseline) = 18.26, SD = 1.86, Min=15, Max=22

^aBinary-coded outcome (0 = No, 1 = Yes)

Table 2

Parameter estimates, standard errors, and significance tests for conditional growth models with time, gender, viral load variability, depression variability, and physical functioning variability as covariates

Outcome Measures	Intercept	Time	Gender	Viral Load Stability	Hamilton Depression Stability	MOS Physical Functioning Stability
Career Readiness						
CDI (Total)	61.73 *** (1.10)	0.19 (0.46)	-1.19 (2.10)	-0.00005 * (0.000026)	0.23 (0.43)	0.26 (0.70)
CDI (Plan)	31.13 *** (0.75)	0.059 (0.30)	-0.25 (1.39)	-0.00004 * (0.000017)	0.28 (0.29)	-0.011 (0.46)
CDI (Knowledge)	30.61 *** (0.56)	0.13 (0.23)	-0.75 (1.05)	-0.00001 (0.000013)	-0.036 (0.22)	0.26 (0.35)
Expectation for Success	43.58 *** (0.35)	0.13 (0.16)	-0.72 (0.68)	0.0000017 (0.0000085)	-0.15 (0.14)	0.25 (0.23)
Conduct Disorder and Substance Use						
Conduct Disorders	2.61 *** (0.18)	0.30 ** (0.092)	0.48 (0.36)	-0.0000063 (0.0000045)	0.23 ** (0.073)	-0.10 (0.12)
Alcohol Use (AUDIT)	3.98 *** (0.33)	0.14 (0.12)	0.18 (0.76)	-0.0000082 (0.0000073)	0.25 * (0.12)	-0.61 ** (0.20)
Sexual Behaviors						
Lifetime Number of Sexual Partners	3.38 *** (0.55)	0.38 (0.53)	0.82 (1.11)	-0.00002 (0.000013)	0.37 (0.23)	0.12 (0.37)
Closeness and Parental Attachment						
Close MOM	1.36 *** (0.094)	0.19 ** (0.060)	-0.13 (0.18)	0.0000019 (0.0000034)	-0.029 (0.036)	0.0061 (0.061)
Got Along	1.90 *** (0.087)	-0.0079 (0.030)	-0.14 (0.15)	-0.0000062 * (0.0000027)	0.031 (0.030)	-0.049 (0.049)
Autonomy						
AFC Self-Family Care	50.49 *** (1.091)	2.26 *** (0.48)	0.59 (2.12)	-0.00002 (0.000026)	1.58 *** (0.43)	-0.65 (0.70)
AFC Management Activity	53.99 *** (0.97)	1.54 *** (0.39)	-1.48 (1.81)	0.000016 (0.000022)	1.020 ** (0.37)	-0.086 (0.60)
AFC Recreational Activity	41.091 *** (0.81)	0.32 (0.34)	0.082 (1.54)	0.000021 (0.000019)	1.024 ** (0.32)	-0.34 (0.51)
AFC Social Vocational Activity	13.29 *** (0.25)	0.059 (0.99)	-0.14 (0.46)	-0.00000092 (0.0000057)	0.24 * (0.095)	-0.074 (0.15)

* p </.05.
 ** p < .01.
 *** p < .001

Table 3

Parameter estimates, standard errors, and significance tests for generalized estimating equations logistic regression, with time, gender, viral load variability, depression variability, and physical functioning variability as covariates

Substance Use and Sexual Behavior Outcomes	Intercept	Time	Gender	Viral Load Stability	Hamilton Depression Stability	MOS Physical Functioning Stability
Ever Marijuana Use	.014 (0.25)	0.13 *** (0.040)	-0.23 (0.47)	0.0000020 (0.00000051)	0.089 (0.097)	-0.0082 (0.16)
Ever Crystal Methamphetamine Use	-2.12 *** (0.34)	0.15 * (0.063)	-0.27 (0.55)	-0.0000073 (0.00000082)	0.22 * (0.22)	-0.20 (0.18)
Vaginal Sex Past 3-Months	-0.12 (0.24)	0.11 * (0.057)	-0.20 (0.35)	-0.0000063 (0.00000045)	-0.019 (0.071)	0.23 (0.13)
Oral Sex Past 3-Months	-1.21 *** (0.26)	0.10 * (0.045)	0.32 (0.45)	-0.000011 (0.00000073)	0.081 (0.090)	0.017 (0.15)

* p </.05.

** p < .01.

*** p < .001

Table 4

T-test results comparing high and low MLH viral load variability groups on Career Development Inventory Items at Baseline, and 18-Month follow-up

Career Development Inventory Items	t	
	Baseline	18-Mo FU
Finding out about educational and occupational possibilities	1.85 ⁺	-1.11
Talking about career plans with an adult who knows something about me.	3.21 ^{**}	-0.28
Taking classes that will help me decide what line of work	1.19	0.88
Taking classes that will help me in college, in job training, or on the job.	1.44	0.25
Taking part in school or after-school activities	1.02	-0.18
Getting a part-time or summer job which will help me decide	2.07 [*]	1.23
Getting money for college or for job training.	0.94	-0.52
Working out problems that might make it hard for me	2.66 [*]	1.01
Getting the kind of training, education, or experience I will need	1.15	-0.15
What people really do on the job.	-0.49	1.80 ⁺
The abilities needed for the occupation.	0.23	2.28 [*]
The working conditions on such jobs.	1.87 ⁺	2.35 [*]
The education or training needed to get such a job.	-0.13	1.91 ⁺
The need for people on that kind of job in the future.	0.46	1.92 ⁺
Different ways of getting into that occupation.	0.00	1.86 ⁺
The chances of advancing in that kind of job or occupation.	-0.24	2.24 [*]
What sort of working day and work week I might have in the occupation.	0.12	0.84
<i>df</i>	63	56
Mean Child Age (PACT III) at Baseline and Follow-up Periods	18.26	19.72

Pattern of t-tests using 75th percentile cutpoint

^{**}
p < .01.

^{*}
p </.05.

⁺
p </.10

Note: Positive t-test values indicate higher scores on each outcome for the lower 75th percentile group (i.e., lower viral load variability group). Effect sizes for t-test values significant at p </.10 or better range from .20 to .38 based on r.

Table 5

Parameter estimates, standard errors, and significance tests for conditional growth models for career readiness outcomes, with time, adolescent/young adult gender, maternal stability measures (viral load, depression, physical functioning), and adolescent/young adult coping efficacy as covariates

Career readiness Outcomes	Intercept	Time	Gender	Viral Load Stability	Hamilton Depression Stability	MOS Physical Functioning Stability	Coping Efficacy
CDI (Total)	61.81 *** (1.08)	0.14 (0.44)	-1.50 (2.04)	-0.00005* (0.000025)	0.38 (0.42)	0.19 (0.67)	1.40 *** (0.31)
CDI (Plan)	31.17 *** (0.74)	0.036 (0.29)	-0.48 (1.35)	-0.00004* (0.000017)	0.37 (0.28)	-0.063 (0.45)	0.85 *** (0.21)
CDI (Knowledge)	30.65 *** (0.56)	0.11 (0.22)	-0.89 (1.02)	-0.00001 (0.000013)	0.026 (0.21)	0.23 (0.34)	0.60 *** (0.16)
Expectation for Success	43.60 *** (0.35)	0.12 (0.15)	-0.80 (0.67)	0.00000097 (0.0000083)	-0.11 (0.14)	0.23 (0.22)	0.34 *** (0.098)

* p </.05.

** p < .01.

*** p < .001