Health, Human Capital and Domestic Violence[†]

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Abstract: We examine the effect of positive health shocks on a woman's likelihood to suffer domestic violence. To identify a causal relationship, we examine a sample of low-income, HIV-positive women and leverage differences in the progression of each woman's illness when an unanticipated HIV treatment advancement (known by its acronym: HAART) is introduced. Our main result is that positive health shocks induced by a pharmaceutical innovation reduced domestic violence among HIV-positive women. This finding is in line with two ideas. First, health is a form of human capital properly viewed as a resource, and second, domestic abuse is causally linked to resource constraints. Next, we show evidence of a particular mechanism behind our main finding. Women who experience a positive health shock—and who therefore expect to live longer—exhibit sharp declines in their use of narcotics and alcohol. Reductions in risky health behaviors like narcotics use reduce violence in two ways. First, they are consistent with investments in human capital, which improve women's options outside of abusive relationships. Second, reductions in risky behaviors can limit a woman's exposure to violence.

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1 Introduction

Domestic violence is tragic, rampant and costly. In the U.S., there are about 4.5 million instances of domestic abuse each year and about 22% of women will be physically assaulted by an intimate partner at least once in their lives (Tjaden and Thoennes, 2000). The annual cost—including direct medical expenditures and losses to productivity—is estimated at about $5.8 billion.[1] By counting productivity losses along with direct healthcare costs, these expenditures highlight two important relationships. The first is the well-established relationship between domestic violence and poor labor market outcomes. This relationship reflects how several factors, like low education or drug abuse, can increase the likelihood of violence and simultaneously discourage successful employment. It also reflects causality in both directions. Abuse can deter human capital accumulation as well as undermine a woman's success at work. Further, women with few resources have worse options outside of violent partnerships (Browne, Salomon, and Bassuk, 1999; Swanberg and Macke, 2006; Aizer, 2010).

Less understood is the relationship between health and domestic violence. Poor health and chronic illness have been shown to be associated with abuse, reflecting how underlying factors, like lack of education and drug abuse, contribute to both (Black et al., 2011). Mechanically, this relationship is also causal, at least in one direction: violence, by its nature, often damages health. Scant attention, however, has been paid to causality in the opposite direction. In other words, we know virtually nothing about the impact of positive health shocks on a woman's likelihood of suffering abuse. This gap in our knowledge is at odds with two key notions: that health is a form of human capital, properly viewed as a resource (Grossman, 1972; Becker, 2007) and that limited resources are causally linked to domestic violence.

This paper makes two main contributions. First, we show that, among poor and chronically ill women, health improvements reduce domestic violence. Consistent with the notion that health is a form of human capital, this finding illustrates how a positive health shock is tantamount to an influx of resources with a tangible impact on individuals, especially those of limited means. This finding also adds a novel dimension to our understanding of the tradeoffs faced by women in abusive partnerships, suggesting that health, like other resources, curbs violence by reducing dependence on abusive partners. In particular, a better outside option can induce a women to leave a violent partner. Alternatively, a healthier

[1] Further costs accrue through spillover effects in classrooms (Carrell and Hoekstra, 2010), intergenerational persistence (Pollak, 2004), emotional duress and compromised quality of life. Annual expenditures cited above probably amount to a gross under-estimation of the true economic costs of domestic violence.

woman may be more capable of defending herself, which means a positive health shock could reduce violence even though a women stays with a violent partner.[2]

Our second main contribution is to isolate a particular mechanism through which positive health shocks reduce violence: a decline in the use of illegal drugs. Previous work shows that health encourages investments in human capital (Ben-Porath, 1967; Jayachandran and Lleras-Muney, 2009; Oster, Shoulson, and Dorsey, 2013). Accordingly, we show that poor, chronically ill women who experience a positive health shock (and who therefore foresee a longer and more productive life) invest in their human capital by reducing the degree to which they engage in risky behaviors like drug use. These modifications in risky behavior can reduce violence in two ways. First, insofar as they amount to investments in human capital, they improve a woman's options outside of potentially violent relationships. Second, by desisting from certain risky behaviors, women can reduce their exposure to violence.

More broadly, although our focus is on low-income, chronically ill women in the context of domestic violence, our findings highlight how relaxing health constraints can help to curtail costly social ills. Direct investments in health capital may therefore present a viable alternative to direct investments in labor market human capital aimed at individuals of limited means. Policies meant to benefit low-income individuals often amount to education or training programs, many of which are both costly and ineffective (Heckman, 2000). In line with our findings, policies providing low-income, chronically ill women with better access to medical care could be a low-cost and effective way to reduce violence (or achieve other desirable social outcomes) in comparison to training programs aimed solely at improving labor market outcomes. The tradeoff between programs comprising direct investments in health versus labor market human capital has been largely ignored in previous literature.

To identify the effects of health improvements on domestic violence, we use a unique panel data set that provides sociodemographic, health and domestic abuse information for a group of low-income, chronically ill women. Importantly, we observe how a group of chronically ill women responded to an unanticipated and exogenous positive shock in medical technology which led to drastic health improvements. We examine domestic violence reports of a group of HIV-infected (henceforth: *HIV+*) women both before and after the introduction of a medical innovation known as HAART, which treats HIV.[3] To establish identification, we

[2]Some studies on violence in relationships appeal to a theoretical framework where individuals in the relationship are assumed to bargain over the amount of violence. This framework is used explains that women with more resources can essentially bargain for less violence if her options outside of the partnership improve relative to what she can expect to gain within the partnership. A leading example is Aizer (2010).

[3]HAART stands for highly active anti-retroviral treatment. There is no vaccine or cure for HIV or AIDS, but HAART is the current standard treatment. In general, 1996 is marked as the year when two crucial clinical guidelines that comprise HAART came to be commonly acknowledged. First, protease inhibitors (made widely available towards the end of 1995) would be an effective HIV treatment. Second, several

compare these responses to those of two control groups, including a subsample of socio-demographically similar women who are not infected with HIV (hereafter: *HIV−*). Moreover, to identify specific mechanisms through which health can influence rates of violence, we exploit rich data on risky behaviors that are often associated with health, violence and labor market outcomes. These behaviors include the use of narcotics such as crack and heroin.

It is important to note that our focus on HIV+ women does not mean that our results are difficult to generalize. HIV, like many other chronic conditions (e.g: diabetes) is harmful or deadly when untreated, but manageable when treated. Indeed, according to the Centers for Disease Control and Prevention, nearly 50% of adults in the U.S. suffer from a chronic condition, about one quarter of whom experience significant limitations in daily activities.[4] Moreover, two key features of HIV and the AIDS epidemic make it a natural setting to study how poor health interacts with socially relevant outcomes like domestic violence. First, the introduction of HAART was unanticipated, providing a quasi-experimental setting that allows us to identify a causal effect of health improvements. Second, the debilitating effects of untreated HIV-infection coupled with the effectiveness of HAART permit sharp identification of health-induced shifts in behavior and outcomes. Untreated, HIV is severe enough to compromise a woman's ability to work and care for herself and her children, which influences her dependence on her partner and thereby her likelihood of suffering abuse. It leads to immune system deterioration (known as AIDS) where fairly routine infections can lead to grave symptoms, illness and death.[5] HAART effectively transformed HIV-infection from a virtual death sentence into a manageable, chronic condition, reducing mortality rates by over 80% within two years of its introduction (Bhaskaran et al., 2008).

Section 2 discusses our conceptual framework, including theories explaining domestic violence and our empirical approach along with a preview of estimates. Section 3 introduces the data set. In Section 4, we results establishing a causal relationship between health and domestic violence. In Section 5, we explore specific mechanisms that explain this relationship. Section 6 concludes.

2 Conceptual Framework

In this section, we discuss how positive health shocks are conceptually related to domestic violence. We start with a review of prevailing theories of domestic violence, augmenting them to accommodate the impact of health. Next, we discuss our empirical approach.

anti-retroviral drugs taken simultaneously could indefinitely delay the onset of AIDS.

[4]For this point, see http://www.cdc.gov/chronicdisease/resources/publications/aag/chronic.htm.

[5]Absent treatment, a newly infected HIV+ subject lives an average of 11 years.

2.1 Some Theories of Domestic Violence

In relating health to domestic violence, we draw upon three prevailing theories, centered around *resources*, *exposure* and *backlash*. The resource theory of domestic violence, often attributed to Gelles (1976), posits that women with more resources have better options outside of abusive partnerships are therefore better-equipped to leave violent partners.[6] The resource theory has been extended to motivate bargaining theories of domestic violence, which show how women with better outside options have higher threat points, can thus more credibly threaten to leave abusive partnerships and therefore bargain for less violence.[7] Consistent with resource theories, low-income and minority women are disproportionately affected by domestic violence since on average they have fewer good options outside of abusive relationships. This pattern holds among the women we examine in this study (Cohen et al., 2000).

Resource and bargaining theories of domestic violence have been used to explain why unilateral non-fault divorce has reduced domestic violence (Stevenson and Wolfers, 2006), why transfers to poor women can reduce abuse (Angelucci, 2008; Pronyk et al., 2006), and why abuse is associated with poor labor market outcomes (Bowlus and Seitz, 2006; Anderberg and Rainer, 2011), specifically, a larger gender wage gap (Aizer, 2010). In our context, a positive health shock can improve a woman's options outside of her partnership. For example, if healthier women have better labor market prospects, their expected resources outside of an abusive partnership improve. Further, an increase in life expectancy caused by a health improvement may induce women to make additional investments in their human capital, further improving options outside of the partnership. This investment could be through a reduction in risky behaviors such as drug use or, alternatively, increases in education, or job training. The resulting improvement in outside options might lead to a reduction in violence as women leave abusive partners. Alternatively, and if bargaining over violence occurs within the relationship, healthier women may remain with their abusive partner, but demand less violence.

In relating narcotics use to health and violence, we leverage the fact that the sort of drug matters. In particular, whereas stimulants like crack cocaine are associated with higher rates of abuse, opiates like heroin are associated with less. Indeed, crack cocaine encourages aggression, but heroin leads to lethargy and sleepiness. To understand why this distinction

[6] Another theory connecting resources to violence (generally attributed to Goode (1971)) posits that violence or coercion are themselves resources that men resort to in order to achieve desirable ends when they lack other means to do so. In this study, we focus on women's resources and how they relate to their options outside of abusive partnership.

[7] A recent example of this type of model is found in Aizer (2010), who emphasizes a woman's earnings relative to her partner's earnings.

in the physiological effects of narcotics is helpful for identifying how health shocks relate to violence, suppose we see that a positive health shock leads to reductions in both crack use and violence. Here, it is possible that health led to lower crack use, which in turn lowered violence. However, it is also possible that health lowered violence directly and that crack use mechanically declined as a result. It would therefore be difficult to conclude that a positive health shock induced a human capital investment in the form of desisting from crack use, which brought improved options and thus lowered violence. Heroin is different. Since heroin use is associated with less (rather than more) violence, if health did reduce violence directly, we might actually expect an increase in heroin use to accompany a reduction in violence. However, in line with Ben-Porath (1967), if health reduces violence by inducing women to invest in their human capital through desisting in risky behaviors like heroin use, we would instead expect to observe a reduction in both heroin use and violence following a positive health shock. In summary, we leverage variation in the physiological effects of different narcotics to identify mechanisms through which health shocks affect violence.

A second prevailing theory explaining abuse is known as the exposure theory of domestic violence. It posits that women are less likely to suffer abuse if they spend less time with their partner (Dugan, Nagin, and Rosenfeld, 1999). This theory can explain the well-documented negative correlation between employment and domestic violence since women at work spend less time with a potentially abusive partner. It has also been explained how economic downturns promote child abuse when men are laid off and spend more time with their kids (Lindo, Schaller, and Hansen, 2013). Aizer (2010) argues that exposure theory ignores individual rationality, specifically, that women who work have better outside options and are therefore in a better position to leave abusive partners. We argue that the exposure theory can be more widely applied to explain why behaviors like drug use or sex with multiple partners are associated with domestic violence.[8] We use the idea that, by engaging in risky behaviors, women effectively expose themselves to greater risk of abuse. Moreover, since it is conceivable that chronically ill women engage in more risky behavior when in better health states, it follows from this generalized exposure theory that health improvements could potentially increase violence.

Finally, the backlash theory of domestic violence predicts that women will face a higher

[8]Cohen et al. (2000) refer to the high within-individual correlation of several risk factors, e.g., drug use accompanied by risky sex, among women in our sample as a *continuum of risk*, a concept that is related to the idea that certain risky behaviors, some driven by better health, might actually expose women to a greater risk of domestic violence. Findings on the cyclical nature of domestic violence in Tauchen and Witte (1995) are also consistent with this sort of within-subject correlation. Also consistent with within-subject correlations of risk factors and violence, Kenney and McLanahan (2006) show that high rates of violence among cohabiting couples are likely driven by selection on unobservables among women and men who self-select into cohabitation, but do not self-select into marriage.

probability of abuse when they exhibit behaviors consistent with a higher probability of undermining their partners' authority. This can include leaving a partner or entering the labor market. This theory has been used to explain so-called *residual violence*, which is violence occurring during a time interval surrounding a woman's departure from a violent partner. This theory also plays a role in policy discussions since the implication is that interventions designed to help abused women could potentially increase violence, at least in the short run.[9] If a positive health shock induces a woman to leave a violent partner (or to take measures that signal her intention to eventually leave), we may actually see increases in violence.

In light of these theories, a positive health shock has a conceptually ambiguous net effect on domestic violence. If health is a resource, it can improve women's options outside of an abusive relationship. Further, if health increases life expectancy and therefore induces women to invest in their own human capital, it would bring further improvements to women's outside options. An improvement to the outside options could reduce violence by encouraging women to exit violent partnerships (or, if a bargaining framework is assumed, to demand less violence from a partner). Nevertheless, the exposure theory of domestic violence suggests that women could conceivably experience increases in violence through changes in their engagement in risky behaviors like crack or heroin use. Finally, potential health-induced reductions in violence may be attenuated if women suffer a backlash when they leave partnerships (or signal their intention to do so by investing in their labor market human capital). Our empirical approach is designed to sort through these competing dynamics.

2.2 Empirical Approach

Our first aim is to compute how a marginal change in health (H) affects the propensity to suffer domestic violence (V), written as:

$$\frac{dV}{dH}. \tag{1}$$

Isolating this relationship using observational data is beset with problems since health is endogenous. Not only is health likely to be driven by omitted factors that simultaneously affect violence, but it may also reflect previous abuse. To overcome these problems, our empirical approach leverages variation in health status at the time of HAART introduction along with the fact that HAART was an unanticipated innovation. Our analysis will consist

[9]For a thorough discussion, see Dugan, Nagin, and Rosenfeld (2001), who study the relationship between domestic violence resources and the backlash effect in the context of intimate partner homicide.

of three main parts.

The first part isolates the causal impact of HAART introduction on domestic violence. The passage of time from the pre- to the post-HAART era affects violence through the impact of HAART availability on health (H) as follows:

$$\Delta V^g = \left[\Delta H^{(g)} \times \frac{\partial V}{\partial H}^{(g)}\right] + \left[\Delta X^{(g)} \times \frac{\partial V}{\partial X}^{(g)}\right] \tag{2}$$

where Δ is the change in a variable from the pre-HAART to the post-HAART eras and (g) indexes groups distinguished by pre-HAART health status. The first expression on the right-hand-side of equation (2) is the effect of HAART introduction on health (the health shock) multiplied by the effect of health on violence. The second expression captures other avenues through which the passage of time between the pre- and post-HAART eras affected violence, capturing secular trends and omitted factors (together denoted X). To calculate the causal effect of HAART, we compute differences in differences, relying on variation in how women respond to exogenous shifts in medical technology depending on their health status at the time of the innovation. To quantify health, we use a common measure of immune system functionality: the number of white blood cells per cubic millimeter of blood or *CD4 count*. Counts between 500-1500 are normal among healthy people. Counts below indicate that immune deterioration has commenced with counts below 300 signaling high susceptibility to common illnesses (a condition known as AIDS).

A crucial component of our analysis is therefore our use of micro-level, longitudinal data that measures the progression of each woman's health at the time of HAART introduction. In the context of domestic violence, how an intervention affects violence can change dramatically depending on pre-treatment characteristics. Studying the effect of cash transfers on violence, for example, Angelucci (2008) finds that wealth and behavior measured prior to the intervention effectively determine whether transfers reduce violence.[10]

In our context, the group most strongly and immediately affected by HAART introduction consisted of HIV+ women with CD4 counts below 400 when HAART was introduced. We focus our analysis on a group of women who were just beginning to fall ill and experience the debilitating effects HIV-infection when HAART was made available (CD4 count between 300 and 399). We refer to this group as the *salient group*. We compare women in the salient group to two control groups of women who were not directly affected by HAART, i.e., women for whom $\Delta H^g = 0$ but who are similar to the salient group at least on observables, i.e.,

[10]More generally, Anderberg and Rainer (2011) predict that employment will affect violence in a way that depends heterogeneously and non-monotonically on a woman's marginal earnings.

$\Delta X \times \frac{\partial V}{\partial X}$ is nearly equal. These groups include HIV− women along with HIV+ women with CD4 counts that never dip below 400 prior to HAART introduction.[11] Using HAART introduction as the treatment, we compare ΔV^g for the salient group and the control groups. This design effectively treats CD4 dipping below 400 just prior to HAART introduction (and becoming part of the salient group) as independent of domestic violence.

We find that reductions in domestic abuse reported by the salient group of HIV+ women are significantly stronger than for comparison groups. We also find stronger responses among African American women, a group that suffers domestic violence at much higher rates than white women and who therefore may respond more strongly to a health shock that facilitates their ability to leave abusive partners. For black women, we find an 8% reduction in reports of domestic violence.[12]

An alternative and obvious treatment group would be HIV-positive women who exhibited AIDS-level CD4 counts prior to HAART introduction (below 300). Although HAART implied a large immediate benefit to them, these women are not an appropriate treatment group. The reason is that we must compare groups for whom health differences between treatment and control groups are arguably quasi-random. For women who had just begun to fall ill in comparison to women who have not, this is an arguably reasonable assumption. For women with AIDS, this is unlikely to be the case.[13] First, as Table 2 shows, among women who exhibit AIDS-level CD4 counts prior to HAART, there is considerable heterogeneity in reports of violence. Women whose CD4 counts fall below 200 are much more likely to report abuse at least once. This may reflect differences on unobservable dimensions. For example, these women may be more likely to engage in behaviors associated with abuse. Further complicating matters, women whose CD4 counts fall below 200 also exhibit strong heterogeneity across time in their reports of abuse. Although they are more likely to report abuse in general, they are less likely to report abuse during periods when their CD4 counts are very low (Table 3). This could mean that their illness becomes so acute that they are effectively too sick to be abused. Given these findings, all of which threaten the validity of comparing low-CD4 count women to healthier women, our analysis does not use low-CD4

[11] Here, we should say that at-risk HIV− women or healthier HIV+ women might also respond to HAART introduction. Even though they are not directly and immediately affected by the new technology, they are affected by it in-expectation. We base our use of control groups on the idea that they are affected by the new treatment less than women who need to take it sooner. The idea that a pharmaceutical innovation affects healthy individuals whom it benefits in expectation has been developed in the context of HIV and risky sexual behavior in Chan, Hamilton, and Papageorge (2013).

[12] For comparison, a study of poor Mexican women shows that a 13-fold increase in a wife's income can reduce domestic violence by 37% (Angelucci, 2008). It is important to note that this is equivalent to a $20 increase in the wife's monthly income.

[13] Using our framework: for low-CD4 count women, although ΔH^g is large $\Delta X^g \times \frac{\partial X}{\partial T}^g$ is likely different for this group versus our control groups.

count women as a treatment group.[14]

Having established this difference in differences, we go on to the second component of our analysis, which uses the timing of HAART introduction as an instrumental variable for health. Whereas differences-in-differences effectively compares shifts across time, the instrument variables approach allows us confirm a more structural interpretation of our findings: that post-HAART reductions in domestic violence are driven by health improvements attributable to HAART introduction. This amounts to estimating the relationship described in equation (1) for different groups. Pooling all data and controlling for initial health status, we show that a 10% increase in CD4 count can reduce domestic violence by about 6 percentage points.[15] Note that this is a lower bound since we have pooled data to include women in the high CD4 count group whose CD4 count may never drop low enough for them to exhibit a large increase. If we focus on women who actually go onto HAART shortly after it is introduced, we find that a 10% increase in CD4 count leads to about an 10% decrease in the likelihood of suffering abuse.

The third component of our econometric analysis exploits rich sociodemographic and behavioral information to explore mechanisms through which health affects domestic violence, including improved labor market outcomes. This amounts to measuring

$$\Delta V^g = \left[\Delta H^{(g)} \times \frac{\partial V}{\partial B}^{(g)} \times \frac{\partial B}{\partial H}^{(g)}\right] + \left[\Delta W^{(g)} \times \frac{\partial V}{\partial W}^{(g)}\right] \tag{3}$$

where B is some outcome or behavior (like drug use) that can be affected by a health shock and also affect domestic violence and the second expression captures other avenues through which the passage of time between the pre- and post-HAART eras affected violence, capturing secular trends and omitted factors (together denoted W).[16] Preliminary analysis suggests that healthier women are more likely to use drugs and that use of some drugs (like crack cocaine) is associated with violence. This raises the possibility that a positive health shock can lead to increases in abuse. We find the opposite: women who show reductions

[14]However, we do use this group in various robustness tests.

[15]Using HAART as an instrument for health also means we explicitly incorporate pre-HAART and post-HAART health measures. Using the before and after dummy as an instrument, however, is potentially problematic since it captures secular trends, including national downward trends in domestic violence during our sample period. The HAART dummy also picks up the effect of being a part of the experimental study generating our data. In Section 4, we provide a detailed discussion of why our use of HAART as an instrument is valid. Most compelling, however, is that our differences-in-differences approach shows that our salient group of HIV+ women were affected by HAART more than several comparison groups, including HIV− women.

[16]In equation (2), these variables were denoted X. Here they are denoted W since how we explain changes in violence in equation (3) is different, e.g., variables considered mechanisms may have been included as controls in equation (2).

in violence reduce their use of drugs associated with abuse. Moreover, women who exhibit less violence after a health shock also reduce their use of drugs associated with *less* abuse, the key example being heroin. Conceptually, the relationship between heroin and violence vs stimulants and violence makes sense. It is also shown in our data in Table 5.

Taken together, these reductions in risky behavior, which accompany reductions in abuse, are consistent with larger investments in their health and labor market human capital in response to a medical shock that lengthens their expected lifespan. In other words, a positive health shock reduces violence by encouraging women to invest in themselves by reducing their risky behavior. Our final set of results asks whether women who experience a health shock, reduced violence and reductions in their use of narcotics also exhibit better labor market outcomes in the years following the health shock. We show limited evidence that they do in the form of slightly higher attachment to the labor market along with increases in their income.

3 Data

To estimate the impact of health shocks on domestic violence, we employ a unique data set from the Women's Interagency HIV Study (WIHS).[17] This study was initiated to investigate the impact of HIV on women in the United States, and the sample is selected accordingly. Semi-annual interviews are conducted with both HIV+ and HIV− women. Women in the sample have engaged in risky behaviors, such as intravenous drug use or unprotected sex and uninfected women are demographically similar to infected women. Each woman in the sample was enrolled in one of six clinical consortia, located in: Bronx/Manhattan, New York; Washington DC; San Francisco/Bay Area; Los Angeles/Southern California/Hawaii; Chicago, IL; and Brooklyn, NY. Participants were recruited from various organizations including primary care clinics, hospitals, community outreach sites, support groups, and drug

[17]Data in this manuscript were collected by the Women's Interagency HIV Study (WIHS) Collaborative Study Group with centers (Principal Investigators) at New York City/Bronx Consortium (Kathryn Anastos); Brooklyn, NY (Howard Minkoff); Washington, DC, Metropolitan Consortium (Mary Young); The Connie Wofsy Study Consortium of Northern California (Ruth Greenblatt); Los Angeles County/Southern California Consortium (Alexandra Levine); Chicago Consortium (Mardge Cohen); Data Coordinating Center (Stephen Gange). The WIHS is funded by the National Institute of Allergy and Infectious Diseases (UO1-AI-35004, UO1-AI-31834, UO1-AI-34994, UO1-AI-34989, UO1-AI-34993, and UO1-AI-42590) and by the Eunice Kennedy Shriver National Institute of Child Health and Human Development (UO1- HD-32632). The study is co-funded by the National Cancer Institute, the National Institute on Drug Abuse, and the National Institute on Deafness and Other Communication Disorders. Funding is also provided by the National Center for Research Resources (UCSF-CTSI Grant Number UL1 RR024131). The contents of this publication are solely the responsibility of the authors and do not necessarily represent the official views of the National Institutes of Health.

rehabilitation programs. For more information, see Barkan et al. (1998).

The WIHS data set is particularly well-suited to study the causal effect of health improvements on domestic violence. First, the panel structure of the data allows us to follow women through the introduction of HAART and to control for permanent unobserved heterogeneity. WIHS started interviewing women in October 1994, before the new therapy became widely available in mid-late 1996. This is an important aspect of our empirical approach, as detailed in Section 2. In addition to this first cohort, a second cohort was added in 2001 and 2002. Because the second cohort was not in the study at the time HAART was introduced, we use the second cohort in a robustness check, allowing us to control for the potential effect of participation in the experiment. Second, there is a rich set of behavioral and socio-demographic and health variables available for analysis. Information is elicited on a rich variety of characteristics, including: employment, income, housing status, sexual behaviors, drug use, and medication use. In terms of health variables: plasma samples are collected, which ensures that the health measure that we use is objective rather than self-reported. Finally, because the HIV− women in the study are similar on many dimensions, but not directly affected through a health improvement by the advent of HAART, we can use them as a control group. Although the sample used in our analysis is not necessarily nationally representative, it is appropriate and well-suited to studying domestic violence. Low income, under-employed and non-white women are more likely to experience domestic violence during their lifetime.

Our measure of health is CD4 count, which indicates how strong one's immune system is and the stage of HIV infection. The count measures the number of CD4 cells in a cubic millimeter of blood. These white blood cells are important because they fight infections, which can be especially dangerous for individuals who are infected with HIV. Individuals who are HIV− typically have CD4 counts between 500 and 1700, while HIV+ women tend to have lower CD4 counts. Counts below 200 are generally classified as AIDS (Acquired Immunodeficiency Syndrome). Once the CD4 count reaches 350, doctors typically recommend beginning antiviral treatment (Mocroft and Lundgren, 2004).

For our main analysis, we define domestic violence as physical or sexual abuse or coercion by an intimate partner or spouse. If a women reported experiencing any of these three forms of violence, we categorize her as having experienced domestic violence. Women faced coercion if a current or previous partner had ever threatened to hurt or kill her, prevented her from leaving or entering her home, seeing friends, making telephone calls, getting or keeping a job, continuing her education, or seeking medical attention. Column 1 of Table 1 shows that 6% of our full sample, HIV+ women in the first cohort who answered questions about domestic violence, reported experiencing sexual abuse between one year before the start of the survey

and the introduction of HAART. During this same time frame, women experienced physical abuse, coercion, and domestic violence at much higher rates, 13% 21%, and 24% respectively. The rates of domestic violence for our comparison groups are shown in columns 2-5: low CD4, salient group, high CD4, HIV− respectively. Although rates of domestic violence are similar across our comparison groups, HIV+ high CD4 count and HIV− women experienced more domestic violence than our salient group.

Women in the study and our sample are not highly educated, come from low income households, are not likely to be employed, are largely minorities, and are more likely to not be married than the average American woman at a comparable age. As Table 1 shows, 65% of our sample is African American, 19% is Hispanic, and 13% is White (non-Hispanic). 65% of sample women graduated high school, compared with national averages of about 80% of females from all races, or 71% for female African Americans, (Heckman and LaFontaine, 2010). Before the introduction of HAART, 47% of our sample lived in households with a maximum yearly incomes below $12,000. Additionally, 39% of our sample was employed before the introduction of HAART, and 29% were married. We present pre-HAART summary statistics, because they are not endogenous.

Because we have micro-level data, we are able to exploit heterogeneous effects of HAART. These effects depend on pre-HAART health, and we base our analysis on this variation. Effectively, our choice of treatment and control groups relies on the assumption that a group of healthy women faced random selection into a CD4 count range such that HAART introduction was a salient and urgent innovation. In particular, our main treatment group consists of women who had minimum pre-HAART CD4 counts between 300 and 399. Again, we refer to this group as the salient group, because they were immediately affected by the introduction of HAART. The most basic current guidelines recommend beginning HAART with CD4 count reaches 350, and our salient group encompasses this neighborhood. In other words, women in the salient group had just begun to experience the debilitating health effects of HIV-infection when HAART came along.

We use two distinct control groups: women with high pre-HAART CD4 counts and HIV− women. For both of these comparison groups, the introduction of HAART had no immediate health benefit. In our framework, this amounts to $\Delta H = 0$ for each group. Notice that our salient group is similar to HIV+ with high CD4 and HIV− women among many dimensions. Compared to the other groupings of CD4 count, the high CD4 count women are most similar to HIV− women.

To be sure, HAART also benefited HIV+, low CD4 count women. However, it is unclear if women who were very sick prior to HAART are appropriate treatment or control groups.

In particular, they are different in observable characteristics and may also be different in unobserved characteristics. This amounts to $\Delta X^{(low)} \frac{\partial V}{\partial H}^{(low)} \neq \Delta X^{(salient)} \frac{\partial V}{\partial X}^{(salient)}$. In particular, women with very low CD4 counts seem to be different, even within the group of low CD4 count women, based on the diagnosis of AIDS, as discussed in the previous section. Thus, in our analysis, we do not rely on low-CD4 count women as a valid treatment group or control group. HIV+ women with low CD4 counts prior to HAART are different on many dimensions that are correlated with domestic violence, which calls into question whether it is appropriate to use them as the only control group to identify shifts caused by health shocks.

Much of our analysis considers African American women separately. Both nationally and in our sample, these women are more likely to report domestic violence. Table 4 presents summary statistics broken down by race. In our sample, African American women also suffer domestic violence at higher rates than the white women in our sample. 30% of African American women reported experiencing domestic violence, compared to just 23% of white women. Further, the African American women in our sample, have on average less education than the white women. They also come from less well off households; 49% had maximal pre-HAART incomes below $12,000 compared to 25% of white women.

4 The Impact of Health on Domestic Violence

In this section, we describe our empirical set up and present out results showing how positive health shocks affect domestic violence. We estimate two models. To identify the causal effect of HAART introduction on domestic abuse, we employ a differences-in-differences approach. We show that the introduction of HAART reduced domestic violence for the salient group, whose health was most affected by the new technology. Second, to isolate the causal effect of health shocks on domestic violence, we use HAART introduction as an IV for health. This approach confirms our suspicions about what is driving HAART-induced changes and also allows us to make use of time-varying, post-HAART health data.

4.1 The Effect of HAART on Domestic Violence

Here, we show the direct effects of the introduction of HAART on domestic violence. We first show that the salient group experienced a reduction in domestic violence compared to our two control groups: healthy HIV+ women and HIV− women. This is especially for African Americans.

We use a differences-in-differences approach to compare the salient group to control

groups who were not affected by the introduction of HAART. We estimate probit models where the dependent variable is an indicator of whether the woman experienced domestic violence since the last visit, using the following specification.

$$DV_{it+1} = X_{it}\beta + HAART_t\alpha + Salient_i\delta + HAART_t \times Salient_i\gamma + \epsilon_{it} \tag{4}$$

where X_{it} is a vector of individual i's characteristics at time t, $HAART_t$ is an indicator variable for HAART being available in period t, and $Salient_i$ is a dummy variable indicating if the woman is in the salient group. We include three groups of variables in X_{it}: basic, demographic, and risky behaviors. Basic controls include age at visit, age squared, age cubed, an indicator variable for race, and an indicator for cite of study. Demographic controls include income (categorical yearly household income, see Table 1 for details), employment status, marital status, and an interaction between employment and income. The third group of controls includes indicators for drug use (crack, cocaine, pot, or heroin) smoking cigarettes, drinking alcohol, the number of male sex partners in the last six months. The third set of controls also includes a variable indicating if the woman lived with kids at the baseline visit. In all specifications, we cluster standard errors at the individual level.

The coefficient of interest is γ, which indicates if the salient group responded differently to the introduction of HAART than the comparison groups. First, we compare the salient group to HIV+ women who were relatively healthy when HAART was introduced. As discussed previously, this group was healthy enough at the introduction of HAART that the new health technology did not immediately affect them, and so $\Delta H = 0$. Next, we compare the salient group to HIV− women. Because this comparison group is not infected with the disease, their health was not directly impacted by the introduction of HAART, again, $\Delta H = 0$. In each case, we then restrict our analysis to African American women and again compare the salient group to the comparison groups.

Our main results are presented in sets of two tables. In each table, we present results from from five different specifications for both our main sample and a subsample consisting of only African American women. In each table, Column 1 includes only an indicator variable for HAART availability and being in the salient group; it does not include the interaction. Column 2 includes the interaction, but no other controls. In columns 3-5, we add the basic, demographic, and risky behavior controls described above, adding one group of controls to each column. In each table, we present the marginal effects of the probit for African Americans at the mean of all other variables. It is important to note that although we do include controls for demographics and risky behaviors such as employment or drug use, these are potentially endogenous. Controlling for these time varying characteristics may soak up

the effect of HAART introduction, eliminating some possible mechanisms which could be driving the reduction in domestic violence, thereby biasing our results toward zero. Because of this, our preferred specifications are found in the third column.

First, we compare the salient group to the high CD4 count HIV+ women. The first panel of Table 6 shows that the salient group experienced a decline in domestic violence that the high CD4 count women did not. The third row shows that compared to the high CD4 count HIV+ women, the salient group experienced a decline in domestic violence of 2.1 - 2.3 percentage points. Although at first glance, this effect appears small, it is important to note that this is equivalent to a 8-10% reduction in domestic violence. For most of the specifications, this is significant at the 10% level. HAART availability is also associated with a decline in domestic violence reports, as shown in the first row. This is because there were secular declines in domestic violence during this time period (Catalano, 2012). The salient group did not experience declines in domestic violence on their own, as shown in the second row.

When we restrict our analysis to African American women, we find that the salient group had a significant reduction in domestic violence compared to the high CD4 count HIV+ women. As discussed previously, we turn our attention to this subsample because African American women experience domestic violence much more frequently than other groups in our survey. Table 6 shows that compared to high CD4 count HIV+, women in the salient group experienced a reduction in the probability of reporting domestic violence of between 2.6 and 3.4 percentage points. This amounts to a 8.5% - 11% reduction in domestic violence for African American women in our salient group compared to HIV+ women. The results are robust across our five different specifications, and all are significant at the 5% level. The African American salient group subsample experienced a reduction in domestic violence compared to the high CD4 HIV+ women that was about two times as large as the full sample.

Next, we compare the salient group to HIV− women. Table 7 shows that there is not a difference in domestic violence incidents between the salient group and HIV− women. The coefficient γ is negative in most of our specifications, but we estimate large standard errors. In the second panel of Table 7, we restrict our sample to African American women and compare the salient group to HIV− women. Compared to HIV− women, the salient group experienced a reduction in the probability of reporting domestic violence of 1.6-2.4 percentage points. Again, this is not a trivial amount; it amounts to a reduction in violence of 5-8%. The interaction between the salient group and HAART availability is significant at the 10% level for all specifications except for the last, when we control for risky behaviors. Again, it is important to note that controlling for time-varying risky behaviors may bias

results towards zero.

Identification relies on the assumption that the path of domestic violence for the salient group of HIV+ women and the control groups would not be systematically different in the absence HAART introduction. This means that the introduction of HAART should be the only factor that drove the salient group to experience a relative reduction in domestic violence. One concern might be that another shift (e.g., a government program or policy change) had an impact on the salient group, but not on the comparison groups (or visa-versa). An obvious candidate is the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA), which reformed welfare and was signed into law in August of 1996, right at the same time HAART was introduced. However, given that the comparison groups are similar among socio-demographic characteristics, including income and education, it is unlikely that welfare reform affected the control group differently than the salient group. Unfortunately, we can not directly test this since our data only contains information about welfare participation after the introduction of HAART.

In Appendix A.1, we perform several robustness checks. First, we show that the results are not driven by an experimental effect or precipitated by interacting with the medical community. Second, we consider an alternate "triple difference" specification. Last, we also consider alternate definitions of domestic violence and alternate definitions of the salient group.

4.2 The Effect of Health Shocks on Domestic Violence

Having established the causal effect of HAART introduction by showing that the salient group experienced a reduction in domestic violence after HAART compared to our control groups, we now examine why HAART had an effect. Since the direct effect of HAART was to improve health, we now use HAART introduction to instrument for health improvements to examine the causal effect of health shocks on domestic violence. We use HAART availability as an instrument for health, and use the following two-stage specification:

$$CD4_{it} = X_{it}\beta + HAART_t\gamma + \nu_{it} \tag{5}$$

$$DV_{it+1} = X_{it}\alpha + \widehat{CD4}_{it}\delta + \epsilon_{it}, \tag{6}$$

where X_{it} is a vector of individual characteristics, $HAART_t$ is a dummy variable for HAART being available, and CD4 is logged CD4 count. Similar to the differences in differences analysis, we include three sets of controls in X_{it}. Our basic controls are age, age squared, age cubed, and race dummies. Demographic controls include dummies for income bins,

employment, interactions between employment and income bins, and dummies for being married, living with their partner, being widowed or separated. Risky controls include dummies for smoking crack, using cocaine, smoking pot, using heroin, a dummy for being a current smoker, a dummy for being a former smoker, dummy variables for being a light drinker (less than three drinks per week), being a moderate drinker (3-13 drinks per week), being a heavy drinker, the number of male sex partners in the last six months, and an indicator variable for living with children at the time of the first visit. The coefficient of interest is δ, which is the causal effect of an increase in CD4 on the probability of reporting domestic violence. If positive health shocks make a woman less likely to experience domestic violence, then δ should be negative.

Our results show that positive shocks to health reduce the probability of domestic violence. Table 8 shows that a 10% increase in CD4 count causes between a .0061 and .0084 reduction in the probability of reporting domestic violence, depending on chosen the specification. Other coefficients are the expected sign: age decreases the probability of reporting domestic violence at a decreasing rate, income is weakly associated with lower rates of domestic violence, and women who are married or living with their partner experience higher rates of domestic violence. This is in line with the exposure theory of domestic violence. We also find that the use of crack, pot, smoking cigarettes, and drinking alcohol are associated with an increase in domestic violence, while heroin use is associated with a decrease in domestic violence.[18]

In order for HAART to be a valid instrument, it must meet two criteria: exogeneity and relevance. First, HAART cannot be correlated with ν, the error term in the second stage. Second, HAART should be strongly correlated with CD4 count. Regarding the first condition, since HAART was introduced very unexpectedly, it is not likely that women were able to change their behavior and thus their CD4 count leading up to the introduction. Figure 1 shows how hopeful women were over time. The graph shows the percentage of women who were hopeful about the future some or all of the time and is broken down by status. There are two reasons that this figure anecdotally show that HAART was not anticipated: (1) HIV+ women experienced a jump in hopefulness right at the introduction of HAART. Before this, the percentage of HIV+ women who reported being hopeful was relatively flat. A year after the introduction of HAART, the line became flat and remained flat; (2) HIV− women did not experience such a jump. If it was a macroeconomic factor driving the increase in hopefulness, then this would be reflected by a jump in the hopefulness

[18]Use of instrumental variables measures the local average treatment effect. In section Appendix A.2, we also look at the average treatment on the treated as well as the effect of the introduction of HAART on women who never took HAART. Results are stronger for women who were on HAART, as would be expected. However, it is difficult to argue that choosing HAART is exogenous.

of HIV− women. See also Detels et al. (2001).

Regarding relevance, there is some guidance in the existing literature about what constitutes a weak instrument, but it mainly applies to cases when the error terms are assumed to be independently and identically distributed. Because we use clustered standard errors, we compare the Kleiberg-Paap rk F statistic to the critical values for the Cragg Donald Wald F statistic, as suggested by Baum, Schaffer, and Stillman (2007). If we are willing to accept a rejection of 10% when it should be 5%, the critical value of 16.38 is well below our Kleiberg-Paap rk F statistics of 86.97, 73.02, and 72.60. Alternatively, a general rule of thumb for analysis with homoskedastic errors is that the F statistic be above 10, (Staiger and Stock, 1997). All three of our specifications meet this suggested requirement.

5 Health and Domestic Violence: Mechanisms

We have shown that a positive health shock reduces a woman's likelihood to suffer domestic violence. However, we have yet to empirically address the question of why or how this occurs. In this section, we consider several possible mechanisms, including changes in human capital investments via modifications in risky health behaviors and changes in labor market outcomes. In particular, we estimate a set of models that examine other outcomes (like employment and drug use) to explore mechanisms through which health shocks affect domestic violence. Our results provide evidence that an increase in health, and thus life expectancy, caused an increase in human capital investments through desisting in behaviors like narcotics use. We also show limited evidence of commensurate improvements to labor market outcomes.[19] Finally, we also consider in greater detail what happens to women who transition into or out of potentially abusive relationships.

5.1 Narcotics, Desisting and Human Capital Accumulation

Returning to the theoretical underpinnings of domestic violence, we ask if women respond to a positive health shock by increasing investments in their own health and human capital. One source of this type of investment would be a decrease in risky behaviors such as drug use or heavy drinking. We note that for our work, there are two main types of risky behaviors: those associated with higher rates of domestic violence and those associated with less. Because the use of stimulants causes aggression, stimulant use is positively correlated with violence. However, because the use of heroin causes lethargy, heroin use is negatively corre-

[19] Our findings is consistent with the Ben-Porath model of human capital accumulation.

lated with domestic violence. If women only decreased their risky behavior associated with more domestic violence, then this might be mechanical. A health shock decreased violence and so we expect even absent investment in human capital, these type of risky behaviors would decrease. However, we also show that women desist in risky behaviors associated with a decrease in domestic violence. We argue that this is strong evidence that because of the positive health shock, women are choosing to invest in their human capital. In this section, we examine HAART-induced changes in risky behaviors (including the use of stimulants and heroin) comparing changes among the salient group to HIV+ women with high CD4 counts and HIV− women. In particular, we estimate models of the following form:

$$B_{it+1} = X_{it}\beta^B + HAART_t\alpha^B + Salient_i\delta^B + HAART_t \times Salient_i\gamma^B + \epsilon_{it}^B \qquad (7)$$

where B refers individual i's behavior (like drug use) at time t. Similar to our specifications in Section 4.1, $HAART_t$ is an indicator for HAART availability in time period t and $Salient_i$ indicates if individual i is in the salient group. Again, we use three different sets of controls in X_{it}: basic, demographic, and risky behaviors.

Table 9 shows that in the full sample, women in the salient group decreased their use of stimulants by 3.3-3.9 percentage points compared to HIV+ high CD4 count women. This corresponds to a decrease in the use of heroin of 8-15%. Most specifications show the results are significant at the 10% level. When we restrict the sample to African American women, Table 10, our results are similar in magnitude but no longer significant in most cases. However, they do suggest that for African Americans in the salient group, heroin use decreased by 6-15% compared to high CD4 count HIV+ African Americans. When we compare the salient group to HIV− women, we see similar outcomes. Women in the salient group decreased their use of stimulants by 12-15% compared to HIV− women. For African American women, the decrease is between 12 and 16%, although it is only statistically significant in the most basic specification. These results are important, but as we stated earlier, stimulants are positively correlated with domestic violence. Since we show that domestic violence decreased after the introduction of HAART, it is expected that stimulant use would also fall.

It is important to show that women in the salient group also decreased their use of heroin. If women were not investing in their human capital, we would expect the use of heroin to rise. Table 11 shows that women in the salient group decreased their use of heroin compared to the high CD4 count HIV+ women. The results are fairly robust and are always significant at least at the 5% level. They show that the salient group decreased their use of heroin by 7-20%. For African Americans in the salient group, the use of heroin decreased by 8-25%.

These are large changes. Results for HIV− women are similar: women in the salient group decreased their use of heroin by 10-20%, which is statistically significant at the 10% level (Table 12). However, the results for African Americans are not significant, although they are all negative. Taken together, the decrease in heroin use is strong evidence that women are investing in their human capital.

Having established that the same group of women who exhibit reductions in domestic violence also exhibit reductions in stimulants and heroin, we next consider why this is the case. One possibility is that women who reduce their drug use effectively lower their exposure to violence. This makes sense when we consider stimulants like cocaine and crack, both of which are positively associated with violence. Use of heroin, on the other hand, is negatively correlated with violence. Therefore, a decline in the use of heroin combined with a decline in violence suggests that women are investing in their human capital, which improves their options outside of violent partnerships. In Appendix Appendix A.3 we also show results for the use of hard drugs as well as heavy drinking.

5.2 Employment and Labor Market Outcomes

We now consider to what degree the increase in human capital investments due to a positive health shock affect employment and labor market outcomes. Given that we see reductions in the use of drugs for our salient group, and given the high correlation in drug use and poor labor market outcomes, we would expect to see better labor market outcomes. We are somewhat limited because the data contains poor measurements of employment and labor market outcomes. Specifically, we have information on labor force participation and categorical household income. However, we are able to show some evidence that the salient group was more likely to be employed post HAART and less likely to in households with the lowest income bin.

We show that for at least on comparison group, the salient group was relatively more likely to be employed after HAART. Table 13 shows that compared to HIV+ high CD4 count women, the salient group was 4.2 - 5.9 percentage points more likely to employed. This translates to an increase of 10-15%. Although not every specification is significant, we argue that the evidence is still there. African Americans in the salient group, are 7.3-8.3 percentage points more likely to be employed than African Americans in the HIV+ high CD4 count group. This corresponds to an increase of about 20%. However, as Table 14 shows, the salient group was no more likely to be employed than HIV− women.

We also present limited evidence that the salient group was less likely to live in households with yearly incomes below $6000. Compared to the high CD4 count HIV+ women, the salient

group was no more or less likely to live in very low income households (Table 15). However, as Table 16 shows, compared to HIV− women, the salient group was less likely to live in households with yearly incomes below $6000. Not every specification is significant, but it does suggest that the salient group was about 20% less likely because of HAART to live in very low income households.

Our analysis of the degree to which labor market outcomes are affected by increased investments in human capital has several important conclusions. First, the labor market effect of HAART is difficult to identify. One key limitation is that the data does not include a better measure of employment. We know if a woman is employed in the six months prior to her interview, not the hours of employment or type of job. This limits us to considering only the extensive margin; we are unable to see if health improvements lead to a response in the intensive margin of labor supply. Similarly, we only have categorical measures of income on the household level. This limits us because we can't measure the true income of the woman. Second, we should consider the potential employment opportunities available for this particular group of women: mostly poor women who are infected with HIV and who report a history of drug use. These women are likely to be constrained by health, education, and their histories of risky behavior. In other words, despite the health shock and subsequent investments in their human capital, the effects on employment may be small. In Appendix Appendix A.3, we show the strong correlations between drug use and employment and consider alternate measures of employment.

5.3 Backlash and Residual Violence

We also consider two different channels in the context of the theory of domestic violence that could be driving the reduction in violence. First, women with improved health may have better outside options and may leave their partner, thus lowering domestic violence. Second, a women may be better able to defend herself from an abusive partner, which would dis-incentivize attacks and decrease violence

Tables 17 through 20 show transition matrices reporting the proportions of women who enter and exit relationships as it relates to reports of violence. The sample is all HIV+ women in the first cohort. Women were divided into four groups: (i) those who did not report domestic violence in either periods t or $t+1$, (ii) those who did report domestic violence in period t but did in period $t+1$, (iii) women who only experienced domestic violence in period t and (iv) women who experienced domestic violence in both periods. For each of the four groups, the table reports the percentage of women who stayed out a partnership, entered a partnership, exited a partnership, or stayed in a partnership based

on their experience of domestic violence. We define a partnership as either being married or living with a partner. Table 17 and 18 show the percent of women who exited or entered a partnership given if they experienced domestic violence in period t or $t+1$. Table 19 and Table 20 show the percent of women who experienced domestic violence each period given what their relationship status was. In each case, we show pre and post HAART. If HAART had an effect on violence, we expect the pre tables to look much different than the post tables.

Table 17 and Table 18 show that women who experienced domestic violence at time t were less likely to stay in a relationship after the introduction of HAART than they were before the introduction. This suggests that women had better outside options after the introduction of HAART. As discussed previously, improvements in outside options allow the woman to leave or credibly threaten to leave the relationship. Table 19 and Table 20 show that women who stayed in the relationship were more likely not to experience domestic violence. Equivalently, they were also less likely to experience domestic violence during any time period. Again, this suggests that the outside options of these women were better and they were able to credibly threaten to leave.

6 Conclusion

We show that positive health shocks reduce domestic violence. In establishing this link, we draw upon two important concepts. First, resource constraints weaken a woman's options outside of an abusive partnership. Second, health is a form of human capital and a health improvement is therefore properly understood as an influx of resources, especially among individuals of limited means for whom health limitations are taxing and salient. Together, these concepts imply that positive health shocks could reduce domestic violence among chronically ill women. We show that they do.

We also show evidence of a specific mechanism behind this finding. Women who experience a positive health shock (and therefore expect to live longer) reduce their use of illegal drugs. This reduction is consistent with increased investments in labor market human capital, which work to improve a woman's resources and options outside of a violent partnership. Further, women who engage in fewer risky behaviors, like using crack cocaine, effectively reduce their exposure to violence.

Our focus on low-income, chronically ill women in the context of domestic violence leads to an important and more general policy implication: health investments can curtail costly social ills. This suggests that investments in health capital constitute a potentially viable

alternative to direct investments in labor market human capital aimed at poor individuals, like education or training programs, many of which are both expensive and ineffective (Heckman, 2000). If a policy goal is to improve the plight of low-income or other vulnerable groups with in poor health, a possible role for direct investments in health capital merits further consideration. Indeed, the trade-off between policies that directly invest in health versus labor market human capital has garnered scant attention in previous research.

Finally, our findings identify an important new avenue through which pharmaceutical innovation creates value by influencing socially relevant outcomes, linking our findings to those in Goldin and Katz (2002), who study the impact of birth control on women's employment and marriage. By isolating a novel source of value of pharmaceutical innovation, our findings also have strong implications for policies affecting how biomedical research dollars should be spent and which medical advances are made available to groups made vulnerable by poor health, including poor women, the elderly and individuals who are chronically ill.

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7 Figures and Tables

Figure 1: Probability of Being Hopeful Some or All of the Time, by Date and HIV Status

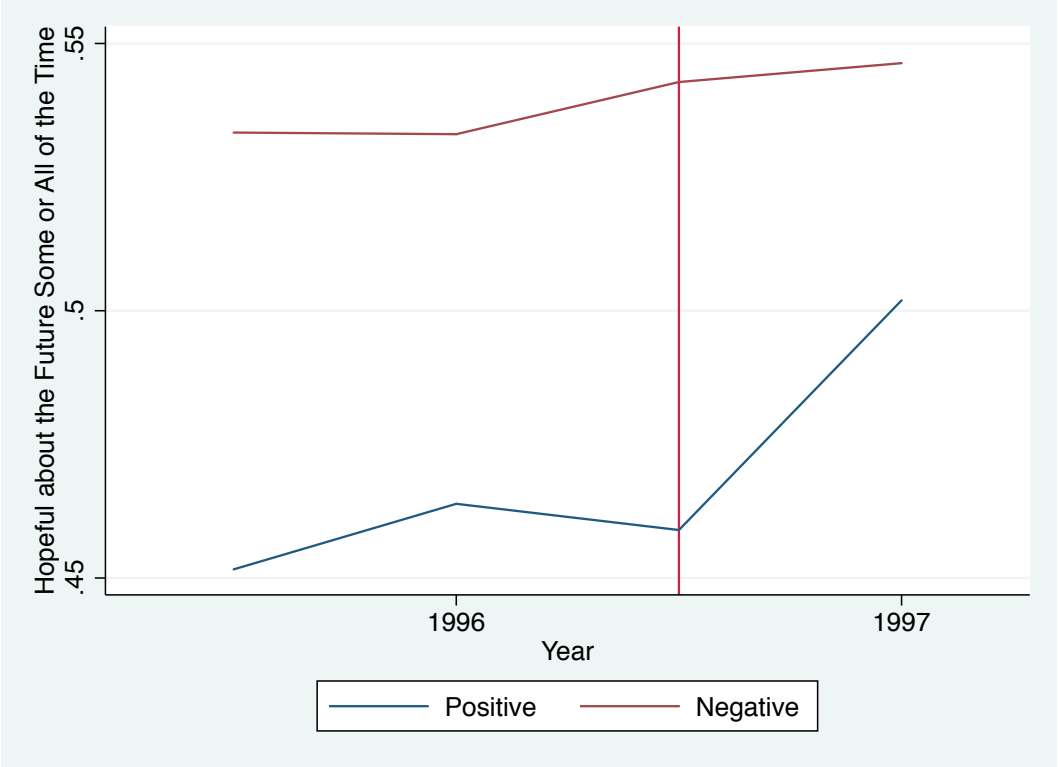

Table 1: Summary Statistics

	(1) Full Sample	(2) Low CD4	(3) Salient Group	(4) High CD4	(5) HIV−
Average Age	41.72	41.94	42.41	41.26	41.24
African American	0.65	0.65	0.68	0.63	0.65
Hispanic	0.19	0.18	0.20	0.21	0.20
White (Non-Hispanic)	0.13	0.14	0.12	0.13	0.13
Other	0.02	0.02	0.01	0.03	0.02
High school grad	0.65	0.66	0.62	0.60	0.69
Some college	0.34	0.34	0.32	0.29	0.39
College grad	0.08	0.07	0.10	0.07	0.11
Pre-HAART Income:					
$\leq$ 6000	0.17	0.16	0.17	0.16	0.18
6000-12000	0.30	0.31	0.34	0.33	0.25
12001-18000	0.16	0.17	0.13	0.15	0.17
18001-24000	0.10	0.10	0.11	0.11	0.10
24001-30000	0.08	0.08	0.07	0.09	0.08
$>$ 30000	0.18	0.18	0.18	0.17	0.22
Employed pre-HAART	0.39	0.31	0.37	0.44	0.56
Married pre-HAART	0.29	0.29	0.31	0.26	0.31
Lives with kids at base line	0.50	0.52	0.52	0.47	0.47
Risky Behaviors pre-HAART:					
Ever smoked	0.64	0.59	0.66	0.69	0.68
Abstainer	0.56	0.61	0.56	0.51	0.50
Light drinker	0.29	0.28	0.28	0.28	0.34
Moderate drinker	0.16	0.14	0.18	0.18	0.17
Heavy drinker	0.08	0.07	0.07	0.09	0.10
Ever used crack	0.20	0.17	0.23	0.22	0.23
Ever used cocaine	0.19	0.15	0.18	0.20	0.27
Ever used pot	0.31	0.27	0.33	0.33	0.37
Ever used heroin	0.13	0.10	0.18	0.15	0.17
Ever used hard drugs	0.30	0.25	0.33	0.31	0.40
Ever used stimulants	0.27	0.22	0.29	0.30	0.36
Violence pre-HAART:					
Experienced sex abuse	0.06	0.04	0.06	0.10	0.08
Experienced physical abuse	0.16	0.11	0.17	0.19	0.23
Experienced coercion	0.26	0.22	0.26	0.27	0.34
Experienced domestic violence	0.28	0.23	0.27	0.33	0.37
Observations	1290	602	163	257	266

The full sample includes all women from the first cohort who answered questions about domestic violence. Low CD4 refers to minimum pre-HAART CD4 count less than 300. The salient group is defined as having a minimum pre-HAART CD4 count between 300 and 399. High CD4 refers to minimum pre-HAART CD4 count greater or equal to 400. Income is measured as yearly household income. Light drinking is defined as less than 3 drinks per week. Moderate drinking is defined as 3-13 drinks per week. Heavy drinking is defined as 14 or more drinks per week. Hard drugs are defined as crack, cocaine, heroin, or (illicit) methadone. Stimulants are defined as crack or cocaine. Domestic violence is defined as physical or sexual abuse or coercion by an intimate partner or spouse. Coercion means that the partner threatened to hurt or kill the subject or prevented her from: leaving or entering her home, seeing friends, making telephone calls, getting or keeping a job, continuing her education, or seeking medical attention.

Table 2: Summary Statistics by pre-HAART AIDS Status, Low CD4 Count Only

	(1) CD4>200	(2) CD4≤200
Average Age	42.15	42.33
African American	0.64	0.65
Hispanic	0.17	0.18
White (Non-Hispanic)	0.16	0.15
Other	0.02	0.02
High school grad	0.67	0.63
Some college	0.36	0.32
College grad	0.07	0.06
Pre-HAART Income:		
≤ 6000	0.16	0.18
6000-12000	0.32	0.29
12001-18000	0.17	0.17
18001-24000	0.09	0.13
24001-30000	0.08	0.07
> 30000	0.17	0.16
Employed pre-HAART	0.28	0.33
Married pre-HAART	0.28	0.25
Lives with kids at base line	0.47	0.51
Risky Behaviors pre-HAART:		
Ever smoked	0.58	0.68
Abstainer	0.63	0.55
Light drinker	0.27	0.28
Moderate drinker	0.14	0.19
Heavy drinker	0.06	0.10
Ever used crack	0.18	0.22
Ever used cocaine	0.15	0.17
Ever used pot	0.25	0.33
Ever used heroin	0.13	0.11
Ever used hard drugs	0.27	0.29
Ever used stimulants	0.24	0.26
Violence pre-HAART:		
Experienced sex abuse	0.03	0.05
Experienced physical abuse	0.10	0.11
Experienced coercion	0.19	0.24
Experienced domestic violence	0.19	0.27
Observations	475	236

Domestic violence is defined as physical or sexual abuse or coercion by an intimate partner or spouse. Coercion means that the partner threatened to hurt or kill the subject or prevented her from: leaving or entering her home, seeing friends, making telephone calls, getting or keeping a job, continuing her education, or seeking medical attention. Low CD4 refers to minimum pre-HAART CD4 count less than 300. Medium CD4 refers to minimum pre-HAART CD4 count between 301 and 400. High CD4 refers to minimum pre-HAART CD4 count above 400. Light drinking is defined as 3-14 drinks per week. Heavy drinking is defined as 14 or more drinks per week. Hard drugs are defined as crack, cocaine, heroin, or (illicit) methadone. Stimulants are defined as crack or cocaine.

Table 3: Domestic Violence Statistics by time of AIDS Diagnosis

	(1) Last visit pre AIDS	(2) First visit with AIDS
Sexual Abuse	0.01	0.01
Physical Abuse	0.05	0.04
Coercion	0.10	0.09
Domestic Violence	0.12	0.09
Observations	738	1927

Domestic violence is defined as physical or sexual abuse or coercion by an intimate partner or spouse. Coercion means that the partner threatened to hurt or kill the subject or prevented her from: leaving or entering her home, seeing friends, making telephone calls, getting or keeping a job, continuing her education, or seeking medical attention. The sample is restricted to HIV+, low CD4 count women from the first cohort before HAART was introduced. AIDS is defined as having CD4 count less than or equal to 200.

Table 4: Summary Statistics by Race

	(1) African American	(2) Hispanic	(3) White
Average Age	42.12	41.07	41.05
High school grad	0.65	0.50	0.85
Some college	0.32	0.23	0.58
College grad	0.06	0.02	0.27
Pre-HAART Income:			
≤ 6000	0.20	0.10	0.08
6000-12000	0.29	0.42	0.17
12001-18000	0.16	0.19	0.12
18001-24000	0.11	0.12	0.05
24001-30000	0.08	0.05	0.12
> 30000	0.15	0.11	0.46
Employed pre-HAART	0.38	0.27	0.59
Married pre-HAART	0.25	0.36	0.35
Lives with kids at base line	0.50	0.63	0.33
Risky Behaviors pre-HAART:			
Ever smoked	0.67	0.59	0.58
Abstainer	0.56	0.62	0.48
Light drinker	0.26	0.27	0.45
Moderate drinker	0.17	0.14	0.15
Heavy drinker	0.09	0.06	0.08
Ever used crack	0.23	0.14	0.16
Ever used cocaine	0.19	0.18	0.20
Ever used pot	0.30	0.29	0.38
Ever used heroin	0.12	0.15	0.17
Ever used hard drugs	0.32	0.27	0.27
Ever used stimulants	0.30	0.24	0.24
Pre-HAART Low CD4	0.47	0.44	0.49
Pre-HAART Medium CD4	0.13	0.13	0.11
Pre-HAART High CD4	0.19	0.22	0.19
Violence pre-HAART:			
Experienced sex abuse	0.07	0.02	0.04
Experienced physical abuse	0.15	0.14	0.18
Experienced coercion	0.28	0.24	0.20
Experienced domestic violence	0.30	0.26	0.23
Observations	842	249	172

Low CD4 refers to minimum pre-HAART CD4 count less than 300. Pre-HAART Medium CD4 is the salient group and is defined as having a minimum pre-HAART CD4 count between 300 and 399. High CD4 refers to minimum pre-HAART CD4 count greater or equal to 400. Income is measured as yearly household income. Light drinking is defined as less than 3 drinks per week. Moderate drinking is defined as 3-13 drinks per week. Heavy drinking is defined as 14 or more drinks per week. Hard drugs are defined as crack, cocaine, heroin, or (illicit) methadone. Stimulants are defined as crack or cocaine. Domestic violence is defined as physical or sexual abuse or coercion by an intimate partner or spouse. Coercion means that the partner threatened to hurt or kill the subject or prevented her from: leaving or entering her home, seeing friends, making telephone calls, getting or keeping a job, continuing her education, or seeking medical attention.

Table 5: The Relationship Between Drug Use and Violence

	[1]	[2]	[3]
Heroin	-.026**	-.026**	-.028***
Stimulants	.036***	.036***	.027***
Age	-.009	-.009	-.009
Age squared	7.30e-06	.00002	.00002
Age cubed	4.23e-07	3.89e-07	3.66e-07
Yearly Income 6001-12000	.	-.008	-.008
Yearly Income 12001-18000	.	-.009	-.009
Yearly Income 18001-24000	.	-.005	-.005
Yearly Income 24001-30000	.	-.016	-.016
Yearly Income > 30000	.	-.002	-.001
Employed	.	-.003	-.003
Yearly income 6001-12000, employed	.	-.0001	.0005
Yearly income 12001-18000, employed	.	-.002	-.002
Yearly income 18001-24000, employed	.	-.017	-.018
Yearly income 24001-30000, employed	.	.007	.007
Yearly income > 30000, employed	.	-.002	-.002
Married	.	.016**	.016**
Not married, lives with prtnr	.	.021***	.020***
Widowed	.	-.011	-.011
Divorced/Annuled	.	.007	.007
Separated	.	.010	.010
Other Marital Status	.	.006	.006
Pot use	.	.	.019***
Current smoker	.	.	-.016
Former smoker	.	.	-.028
Light drinker	.	.	-.002
Moderate drinker	.	.	.010
Heavy drinker	.	.	.030***
No. male sex prtnr SLV	.	.	.00008
Obs.	17949	17949	17949

The sample is restricted to women from the first cohort who answered questions about domestic violence. Each specification uses individual level fixed effects. We show reported violence at period t+1 and drug use during period t in order to bypass the possibility of simultaneity. We do not want to pick up responses to domestic violence (e.g., using drugs as a coping mechanism).

Table 6: Differences in Differences for Salient Group and High CD4 HIV+ Women in the First Cohort using a Probit Specification

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.063***	-.051***	-.035***	-.021*	-.022**
	(.010)	(.012)	(.013)	(.011)	(.011)
Salient Group	-.023**	-.007	-.003	-.007	-.007
	(.010)	(.013)	(.015)	(.013)	(.012)
Salient × HAART	.	-.023*	-.027*	-.021	-.021*
		(.012)	(.014)	(.013)	(.012)
Obs.	6623	6623	6623	6623	6623
African Americans					
HAART available	-.080***	-.061***	-.042***	-.026**	-.025**
	(.013)	(.016)	(.014)	(.012)	(.012)
Salient Group	-.024*	-.0007	.004	-.004	-.004
	(.013)	(.017)	(.016)	(.014)	(.013)
Salient × HAART	.	-.034**	-.033**	-.026**	-.026**
		(.015)	(.014)	(.013)	(.013)
Obs.	4246	4246	4246	4246	4246
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The Salient Group is defined as having a minimum pre-HAART CD4 count between 300 and 399. The sample is restricted to HIV+ women from the first cohort who answered questions about domestic violence. Basic controls include age at visit, age squared, age cubed, race (Caucasian omitted), and cite of visit (Chicago omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and income bin. Risky behavior controls include crack use, cocaine use, pot use, heroin use, cigarette smoking (never smoker omitted), alcohol use (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table 7: Differences in Differences for Salient Group and HIV− Women in the First Cohort using a Probit Specification

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.068***	-.064***	-.058***	-.045***	-.039***
	(.011)	(.015)	(.013)	(.011)	(.010)
Salient Group	-.012*	-.009	-.011	-.013	-.010
	(.007)	(.010)	(.011)	(.009)	(.008)
Salient × HAART	.	-.003	-.005	-.003	.0009
		(.009)	(.011)	(.010)	(.009)
Obs.	6499	6499	6499	6499	6499
African Americans					
HAART available	-.081***	-.066***	-.043***	-.033***	-.026**
	(.013)	(.016)	(.014)	(.013)	(.012)
Salient Group	-.009	.007	.007	.003	.005
	(.011)	(.016)	(.014)	(.012)	(.011)
Salient × HAART	.	-.024*	-.023**	-.019*	-.016
		(.014)	(.012)	(.010)	(.010)
Obs.	4348	4348	4348	4348	4348
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The Salient Group is defined as having a minimum pre-HAART CD4 count between 300 and 399. The sample is restricted to women from the first cohort who answered questions about domestic violence. Basic controls include age at visit, age squared, age cubed, race (Caucasian omitted), and cite of visit (Chicago omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and income bin. Risky behavior controls include crack use, cocaine use, pot use, heroin use, cigarette smoking (never smoker omitted), alcohol use (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table 8: Causal Effect of Health on Domestic Violence, using HAART as an Instrument

	[1]	[2]	[3]
Logged cd4 count	-.082***	-.067***	-.060***
Age	-.029**	-.027**	-.023**
Age squared	.0005**	.0005*	.0004
Age cubed	-3.16e-06*	-2.83e-06	-2.06e-06
African American	.015	.013	.014
Hispanic	.006	-.00004	.010
Other race	.057*	.047	.056**
Yearly Income 6001-12000	.	-.014	-.009
Yearly Income 12001-18000	.	-.011	-.001
Yearly Income 18001-24000	.	-.026*	-.012
Yearly Income 24001-30000	.	-.040**	-.027
Yearly Income > 30000	.	-.034**	-.022
Employed	.	-.011	.0002
Yearly income 6001-12000, employed	.	.025	.020
Yearly income 12001-18000, employed	.	.007	-.0008
Yearly income 18001-24000, employed	.	.012	.006
Yearly income 24001-30000, employed	.	.036	.029
Yearly income > 30000, employed	.	.012	.007
Married	.	.031***	.033***
Not married, lives with prtnr	.	.042***	.040***
Widowed	.	-.0002	.007
Divorced/Annuled	.	.027**	.032***
Separated	.	.031***	.031***
Other Marital Status	.	-.002	.005
Crack use	.	.	.038**
Cocaine use	.	.	.025
Pot use	.	.	.041***
Heroin use	.	.	-.041**
Current smoker	.	.	.032***
Former smoker	.	.	.019**
Light drinker	.	.	.003
Moderate drinker	.	.	.017
Heavy drinker	.	.	.047**
No. male sex prtnr SLV	.	.	.0004
Lives with kids at base line	.	.	-.005
Obs.	13514	13514	13514

The sample is restricted to HIV+ women from the first cohort who answered questions about domestic violence. The omitted income category is less than $6000; Caucasian is the omitted race; never married is the omitted marital status; never smoker is the omitted smoking category; abstainer is the omitted drinking category. Standard errors clustered by individual.

Table 9: Differences in Differences for Salient Group and High CD4 Count HIV+ Women in the First Cohort using a Probit Specification, Use of Stimulants

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.058***	-.043***	-.074***	-.034***	-.032***
	(.010)	(.012)	(.016)	(.011)	(.012)
Salient Group	-.019	.010	.016	.016	.023
	(.018)	(.020)	(.022)	(.016)	(.016)
Salient × HAART	.	-.034**	-.027	-.021	-.024*
		(.015)	(.017)	(.013)	(.013)
Obs.	15653	15653	15653	15653	15653
African Americans					
HAART available	-.071***	-.053***	-.084***	-.044***	-.040**
	(.014)	(.018)	(.020)	(.017)	(.016)
Salient Group	-.011	.024	.035	.026	.034
	(.025)	(.030)	(.029)	(.025)	(.025)
Salient × HAART	.	-.039*	-.029	-.018	-.022
		(.023)	(.022)	(.020)	(.020)
Obs.	8980	8980	8980	8980	8980
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

Stimulants are defined as having used crack or cocaine in the last six months. The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Basic controls include age at visit, age squared, and age cubed. Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table 10: Differences in Differences for Salient Group and HIV− Women in the First Cohort using a Probit Specification, Use of Stimulants

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.059***	-.041***	-.093***	-.046***	-.043***
	(.011)	(.014)	(.021)	(.016)	(.016)
Salient Group	-.038**	-.005	-.018	-.018	-.012
	(.019)	(.021)	(.024)	(.020)	(.020)
Salient × HAART	.	-.039**	-.033	-.033*	-.034*
		(.017)	(.021)	(.018)	(.018)
Obs.	14321	14321	14321	14321	14321
African Americans					
HAART available	-.074***	-.053***	-.096***	-.050**	-.051**
	(.016)	(.020)	(.025)	(.021)	(.021)
Salient Group	-.044	-.005	-.010	-.018	-.010
	(.027)	(.033)	(.031)	(.028)	(.028)
Salient × HAART	.	-.046*	-.042	-.037	-.037
		(.025)	(.026)	(.024)	(.024)
Obs.	8460	8460	8460	8460	8460
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

Stimulants are defined as having used crack or cocaine in the last six months. The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Basic controls include age at visit, age squared, and age cubed. Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table 11: Differences in Differences for Salient Group and High CD4 Count HIV+ Women in the First Cohort using a Probit Specification, Use of Heroin

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.032***	-.018**	-.024***	-.006*	-.006
	(.007)	(.007)	(.008)	(.004)	(.004)
Salient Group	-.012	.012	.011	.007	.008
	(.010)	(.013)	(.009)	(.005)	(.005)
Salient × HAART	.	-.028***	-.017**	-.009**	-.010**
		(.009)	(.007)	(.004)	(.004)
Obs.	15649	15649	15649	15649	15649
African Americans					
HAART available	-.031***	-.017*	-.036***	-.016**	-.014*
	(.009)	(.010)	(.010)	(.008)	(.007)
Salient Group	-.012	.013	.013	.007	.009
	(.013)	(.017)	(.013)	(.010)	(.010)
Salient × HAART	.	-.028**	-.016*	-.010	-.011
		(.013)	(.010)	(.008)	(.007)
Obs.	8977	8977	8977	8977	8977
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Basic controls include age at visit, age squared, and age cubed. Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table 12: Differences in Differences for Salient Group and HIV− Women in the First Cohort using a Probit Specification, Use of Heroin

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.040***	-.026**	-.032***	-.013**	-.012*
	(.009)	(.010)	(.010)	(.006)	(.006)
Salient Group	-.028**	-.006	-.006	-.005	-.005
	(.012)	(.014)	(.010)	(.006)	(.006)
Salient × HAART	.	-.027**	-.019**	-.013**	-.013**
		(.012)	(.009)	(.006)	(.006)
Obs.	14320	14320	14320	14320	14320
African Americans					
HAART available	-.042***	-.031**	-.038***	-.023**	-.023**
	(.012)	(.015)	(.013)	(.010)	(.010)
Salient Group	-.021	-.004	.001	-.002	-.002
	(.015)	(.018)	(.011)	(.009)	(.009)
Salient × HAART	.	-.021	-.015	-.011	-.011
		(.016)	(.010)	(.008)	(.008)
Obs.	8460	8460	8460	8460	8460
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Basic controls include age at visit, age squared, and age cubed. Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table 13: Differences in Differences for Salient Group and High CD4 HIV+ Women in the First Cohort using a Probit Specification, Employment

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	.062***	.042***	.071***	.074***	.050***
	(.013)	(.016)	(.015)	(.015)	(.016)
Salient Group	-.006	-.056*	-.031	-.040	-.050*
	(.030)	(.034)	(.030)	(.030)	(.030)
Salient × HAART	.	.059*	.042	.049*	.045
		(.030)	(.027)	(.028)	(.029)
Obs.	15838	15838	15838	15838	15838
African Americans					
HAART available	.070***	.043**	.090***	.092***	.060***
	(.017)	(.021)	(.022)	(.022)	(.022)
Salient Group	.006	-.064	-.053	-.052	-.069
	(.039)	(.043)	(.044)	(.045)	(.043)
Salient × HAART	.	.083**	.074*	.075*	.073*
		(.042)	(.041)	(.041)	(.042)
Obs.	9096	9096	9096	9096	9096
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The salient group is defined as having a minimum pre-HAART CD4 count between 300 and 399. The sample is restricted to women from the first cohort. Basic controls include age at visit, age squared, age cubed, race (Caucasian omitted), and cite of visit (Chicago omitted). Demographic controls include marital status (never married omitted). Risky behaviors include crack use, cocaine use, pot use, heroin use, cigarette smoking (never smoker omitted), alcohol use (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table 14: Differences in Differences for Salient Group and HIV− Women in the First Cohort using a Probit Specification, Employment

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	.091***	.083***	.134***	.134***	.101***
	(.016)	(.020)	(.019)	(.020)	(.022)
Salient Group	-.116***	-.135***	-.115***	-.116***	-.143***
	(.030)	(.035)	(.033)	(.033)	(.033)
Salient × HAART	.	.023	.004	.002	-.0001
		(.033)	(.032)	(.032)	(.034)
Obs.	14487	14487	14487	14487	14487
African Americans					
HAART available	.099***	.082***	.175***	.171***	.124***
	(.021)	(.026)	(.027)	(.027)	(.030)
Salient Group	-.104***	-.147***	-.125***	-.120**	-.145***
	(.040)	(.046)	(.047)	(.047)	(.046)
Salient × HAART	.	.051	.023	.019	.021
		(.046)	(.047)	(.047)	(.048)
Obs.	8589	8589	8589	8589	8589
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The salient group is defined as having a minimum pre-HAART CD4 count between 300 and 399. The sample is restricted to women from the first cohort. Basic controls include age at visit, age squared, age cubed, race (Caucasian omitted), and cite of visit (Chicago omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and income bin. Risky behaviors include crack use, cocaine use, pot use, heroin use, cigarette smoking (never smoker omitted), alcohol use (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table 15: Differences in Differences in Household Income Below $6000 per Year for Salient Group and HIV+ High CD4 Count Women in the First Cohort using a Probit Specification

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.110***	-.106***	-.106***	-.086***	-.069***
	(.010)	(.012)	(.012)	(.014)	(.014)
Salient Group	-.053***	-.040**	-.040**	-.055**	-.050**
	(.015)	(.020)	(.020)	(.021)	(.022)
Salient × HAART	.	-.017	-.017	-.023	-.019
		(.020)	(.020)	(.022)	(.023)
Obs.	26915	26915	26915	26915	26915
African Americans					
HAART available	-.144***	-.136***	-.136***	-.108***	-.086***
	(.014)	(.017)	(.017)	(.018)	(.018)
Salient Group	-.026	-.002	-.002	-.016	-.008
	(.021)	(.029)	(.029)	(.027)	(.027)
Salient × HAART	.	-.029	-.029	-.033	-.031
		(.027)	(.027)	(.026)	(.026)
Obs.	15679	15679	15679	15679	15679
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The salient Group is defined as having a minimum pre HAART CD4 count between 300 and 400. Basic controls include age at visit, age squared, age cubed, race (Caucasian omitted), and a dummy for cite of study. Demographic controls include employment status and dummy variables for marital status (never married omitted). Risky behavior controls include crack use, cocaine use, pot use, heroin use, alcohol use (abstainer omitted), cigarette use (nonsmokers omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table 16: Differences in Differences in Household Income Below $6000 per Year for Salient Group and HIV− Women in the First Cohort using a Probit Specification

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.104***	-.092***	-.092***	-.071***	-.051**
	(.013)	(.017)	(.017)	(.020)	(.020)
Salient Group	-.075***	-.052**	-.052**	-.075***	-.063**
	(.018)	(.023)	(.023)	(.025)	(.025)
Salient × HAART	.	-.029	-.029	-.042*	-.038
		(.023)	(.023)	(.025)	(.026)
Obs.	15975	15975	15975	15975	15975
African Americans					
HAART available	-.144***	-.127***	-.127***	-.086***	-.059**
	(.018)	(.024)	(.024)	(.027)	(.026)
Salient Group	-.053**	-.022	-.022	-.042	-.026
	(.024)	(.033)	(.033)	(.031)	(.032)
Salient × HAART	.	-.038	-.038	-.051*	-.051*
		(.031)	(.031)	(.030)	(.030)
Obs.	9339	9339	9339	9339	9339
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The salient group is defined as having a minimum pre-HAART CD4 count between 300 and 399. The sample is restricted to women from the first cohort. Basic controls include age at visit, age squared, age cubed, race (Caucasian omitted), and cite of visit (Chicago omitted). Demographic controls include marital status (never married omitted). Risky behaviors include crack use, cocaine use, pot use, heroin use, cigarette smoking (never smoker omitted), alcohol use (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table 17: Partnership, Domestic Violence Transition Matrix Salient Group, Pre-HAART

	No DV	DV only at t+1	DV only at t	DV at t and t+1	Total
Stayed out	61	45	55	45	59
Entered	4	5	5	1	4
Exited	4	11	7	7	5
Stayed in	30	40	33	47	32
Total	100	100	100	100	100
N	2823	167	276	128	3394

Partnership refers to being married or living with a partner. Numbers refer to the percentage of women in each category.

Table 18: Partnership, Domestic Violence Transition Matrix Salient Group, Post-HAART

	No DV	DV only at t+1	DV only at t	DV at t and t+1	Total
Stayed out	64	56	62	54	63
Entered	4	3	2	5	4
Exited	4	11	7	8	4
Stayed in	28	30	28	33	28
Total	100	100	100	100	100
N	3579	149	184	101	4013

Partnership refers to being married or living with a partner. Numbers refer to the percentage of women in each category.

Table 19: Domestic Violence, Partnership Transition Matrix HIV+ Women in the First Cohort, Pre-HAART

	Stayed out	Entered	Exited	Stayed in	Total
No DV	86	84	72	80	83
DV only at t+1	4	6	11	6	5
DV only at t	8	10	12	8	8
DV at t and t+1	3	1	5	6	4
Total	100	100	100	100	100
N	2013	143	166	1072	3394

Partnership refers to being married or living with a partner. Numbers refer to the percentage of women in each category.

Table 20: Domestic Violence, Partnership Transition Matrix HIV+ Women in the First Cohort, Post-HAART

	Stayed out	Entered	Exited	Stayed in	Total
No DV	90	92	78	89	89
DV only at t+1	3	3	10	4	4
DV only at t	5	3	8	5	5
DV at t and t+1	2	3	5	3	3
Total	100	100	100	100	100
N	2541	158	173	1141	4013

Partnership refers to being married or living with a partner. Numbers refer to the percentage of women in each category.

Appendix A Additional Robustness Checks

Appendix A.1 Differences-in-Differences

In this section we perform several robustness checks on our differences in differences specification. We consider whether there was an experimental effect, whether the results are driven purely by an interaction with the medical community, different definitions of domestic violence, and alternate definitions of the salient group.

One concern with our framework is that being a part of the WIHS study itself affected women. Because women in the survey are informed about their health status and referred to counselors after they report experiencing domestic violence, we might worry that our results are driven purely by an experimental effect. To address this concern, we compare women in the first cohort, whom we observe before and after the introduction of HAART, to women in the second cohort, whom we observe only after the introduction of HAART. The reasoning is that, whereas the first-cohort women experienced both the experimental effect and the effect of HAART, the second-cohort women only experienced the experimental effect. We use a difference-in-difference specification which nets out the effect of being part of the study, leaving us with only the effect of HAART. However this exercise becomes slightly more complicated since we must also contend with changes in secular trends in domestic violence during this period. For example, females experienced a 48.2% decrease in domestic violence between 1994 and 2000, but only a 31.2% decrease between 2000 and 2005. African American females experienced a 58.0% decrease between 1994 and 2000 and 16.4% decrease between 2000 and 2005 (Catalano, 2012). Differences-in-differences results comparing the first and second cohort would capture this trend. In other words, using the second cohort to capture a pure experimental effect to isolate the effect of HAART may not be valid.

One group that did not experience this same leveling-off in the secular decline in domestic violence includes women under the age of 35 (Catalano, 2012), and so we can use these women to control for the experiment effect. For this specification, we compare women in the first and second cohorts who were in the survey for at least six visits. This corresponds to staying in the study until at least March 1997- July 1998 for the first cohort, after the introduction of HAART. Again, we are interested in the coefficient γ, which shows how the first cohort reacted compared to the second cohort after seven visits. If HAART is driving our results, then the coefficient would be negative. Table A1 shows that, using the appropriate control group of second-cohort women who are not part of a group experiencing a decline in the magnitude of secular declines in domestic violence, we find that the first cohort experienced a relatively larger reduction in domestic violence. This is consistent with the notion that,

beyond the effects of secular shifts in domestic violence and the effects of being part of the WIHS study, the first cohort women exhibited additional declines in domestic violence that are attributable to the introduction of HAART. Specifically, the first cohort experienced a reduction of domestic violence of between 8.4 and 12.1 percentage points. This is equivalent in a reduction of domestic violence between 33.6% and 48.4%.[20]

One other reason that HAART may reduce domestic violence if contact with the medical community itself leads to a reduction in domestic violence. This could happen if women who visit the doctor to obtain HAART are given additional resources or information. This is similar to the effect of being in the study itself. To test this, we compare the HIV+ low CD4 women to our salient group. The low CD4 count women are more likely to be on HAART and thus more likely to have contact with the medical community. If the low CD4 count women experienced a reduction in domestic violence after the introduction of HAART as compared to our salient group, this could be a competing explanation. However, as shown in Table A2, the salient group experienced a reduction in domestic violence compared to the low CD4 count women which is significant in all specifications at least at the 5% level. Similarly, African American women in the salient group experienced a reduction in domestic violence compared to the African American women with low CD4 counts. Because the low CD4 count women have more contact with the medical community than our salient group, it cannot be the case that contact with the medical community is the only reason that domestic violence fell for the salient group after the introduction of HAART.

Next, we consider alternative definitions of domestic violence. Similar to our initial difference-in-difference approach, we compare our salient group to HIV− women as well as to HIV+ women with minimum pre-HAART CD4 counts above 400. We do this comparison based on physical abuse, coercion, and sexual abuse separately to see which of these is driving the decrease in domestic violence. Table A3 shows that there was no difference in reported physical abuse between our salient group and HIV− women after the introduction of HAART. However, when we focus on African American women, we find that our salient group experienced a significant reduction in domestic violence after the introduction of HAART when compared to HIV− African American women. Women in the African American salient group were between 1.6 and 2.1 percentage points less likely to report physical abuse. This is equivalent to a 12.3%-16.2% reduction in physical abuse. When we compare the salient group to HIV+ women with high pre-HAART CD4 counts, we find that there is no difference in reported physical abuse, as shown in Table A4.

Next, we focus on coercion. When we compare the salient group to HIV+ high CD4

[20] All specifications of this robustness check are significant at the 10% level.

count women, we find that they also did not experience a change in coercion. Table A5 shows that the salient group was slightly less likely to experience coercion, but not significantly so. However, when we restrict our sample to African American women, we find that our salient group experienced a reduction in coercion between 2 and 2.6 percentage points, or 8.7% to 11.3%, compared to HIV+ women with high CD4 counts. This set of results is significant at the 5% level. When we compare our salient group to HIV− women, we find that there was no decrease in coercion after the introduction of HAART. Table A6 shows that women in the salient group were actually 1.7 and 2.1 percentage points more likely to experience coercion when compared to HIV− women. However, none of our specifications are statistically significant. When we restrict our sample to African American women, the results do not change; the introduction of HAART did not make African American women in our salient group less likely to experience coercion.

There is no difference in reported rates of sexual abuse when comparing our salient group to both HIV− women and HIV+ women with high CD4 counts, as shown in Table A7. Similarly, Table A8 shows there was no difference for HIV+ women, even when restricted to African American women.

To summarize, when we break domestic violence into the three different components, we find that the post-HAART reduction in domestic violence is being driven by reductions in physical abuse and coercion. When comparing our salient group to HIV− women, the overall reduction is predominately caused by a reduction in physical abuse for African American women. Alternatively, when comparing our salient group to HIV+ women who had high pre-HAART CD4 counts, we find that the reduction in overall domestic violence is driven by a reduction in coercion for African American women. In all cases, sexual abuse is not an important factor in the reduction of domestic violence.

As a final robustness test, we consider different definitions of the salient group. Our original delineation of the salient group (300-400) focuses on a group who had been in relatively good health, but have also just begun to see their health slip to such that immune suppression is a salient reality and access to effective medicine is now urgent. Although there is some debate as to when, precisely, to start HAART treatment, it is important to note that current accepted guidelines advocate beginning when CD4 counts hit 350. However, as numbers between 250 and 500 have been suggested in the past, we expand our salient group, first to pre-HAART minimum CD4 count between 300 and 449 and again to between 300 and 499 (Mocroft and Lundgren, 2004). Not surprisingly, including women with in better health in the treatment group leads to noisier estimates since we effectively include women for whom HAART introduction did not yet amount to a salient relaxation of resource constraints. Never-the-less, results still suggest a larger reduction in domestic violence in comparison to

control groups. Results are presented in Tables A9- A12 and in general show that, although estimates of the coefficient of interest are noisier (often not significantly different from 0), they does suggest that our alternative definition of the salient group experienced a greater reduction in domestic violence than the HIV+ women with higher CD4 counts and HIV− women, especially when we focus on African American women.

Appendix A.2 Instrumental Variables

Instrumental variables measures the local average treatment effect. In our framework, we can think about this as an intent to treat or ITT effect. Essentially, it measures the effect of the introduction of HAART for women whose health improved. In the literature, these women would be referred to as "compliers." Because almost all of the HIV+ women, experienced an improvement in health after the introduction of HAART, we think that our results are generalizable within this population.

We also consider the average treatment on the treated or ATT as well as the effect on women who never took HAART. These groupings are endogenous, but still worthwhile as an robustness check. The comparison shows that the ATT coefficients are much larger, about 1.75 times, than ITT coefficents (see Table A13). This suggests that HAART use is driving the reduction in domestic violence. When we look at women who were never on HAART, we see that health improvements had no effect on domestic violence.

We also show instrumental variables results for just our salient group. Here, we choose to focus on level measures of CD4 as opposed to the log CD4 count. This is because we focus on such a narrow window of CD4 count that the log specification is nearly flat. Table A14 shows that health shocks reduced the probability of domestic violence for our salient group.

Instrumental variables basically measures the difference in domestic violence over time. This approach is important because it allows us to say why the reduction occurred: through health improvements. However, we prefer the differences-in-differences approach, as it allows us to make comparisons in the prevalence of domestic violence over time across groups. Because we recognize that different groups respond to the health shock differently, the differences-in-differences specification is more informative.

Appendix A.3 Mechanisms

In Section 5, we showed that the salient group responded to the introduction of HAART by increasing investments in their human capital, through a reduction of drug use. In this section, we consider two alternate types of drugs: hard drugs and heavy drinking.

We find that the salient group reported using hard drugs (defined as crack, heroin, methadone or cocaine) significantly less after the introduction of HAART when compared to both HIV− women and HIV+ women with high CD4 counts. Table A15 shows that, when compared to HIV+ women with high CD4 counts, the salient group exhibit a reduction in the use of hard drugs between 3.2 and 4.3 percentage points, which amounts to between a 9% and 12% decrease.[21] Table A16 shows that the salient group was between 3.3 and 4.6 percentage points less likely to use hard drugs after the introduction of HAART as compared to HIV− women. Given that 35% of the salient group used hard drugs before the introduction of HAART, this accounts for between a 9.4% and 13.1% drop in the use of hard drugs. When we restrict our sample to African American women, we find a drop that is similar in magnitude, though estimated coefficients are not significantly different from zero.[22] The results comparing HIV+ women with high CD4 counts to our salient group are very similar to results when the comparison group is HIV− women.

Similar to the use of hard drugs, we also find that the salient group reduced their intake of alcohol compared to both HIV− women and HIV+ women with high CD4 counts. When we compare the salient group to HIV+ women with high CD4 counts, the effect is smaller but still statistically significant in most specifications. According to Table A17, salient group women were 1.2 to 1.7 percentage points less likely to be heavy drinkers relative to the high-CD4-count HIV+ control group. This amounts to a relative decrease of 17.1% to 24.3%. For African American women, the results are similar in magnitude but are not significant. TableA18 show that relative to HIV− women, the salient group was between 2.3 and 3.1 percentage points (or between 32% and 44%) less likely to be heavy drinkers after the introduction of HAART. As the second panel of Table A18, the results when the sample is restricted to African American women are very similar.

Next, we ask if reductions in drug use are related to improved labor market outcomes in the short-term and medium-term for the salient group. We consider the relationship between drug use at time t and employment in periods $t+4$, $t+6$, and $t+8$ for the salient group. This corresponds roughly to employment 2, 3, and 4 years out. We consider the relationship between employment and hard drug use, heroin use, stimulant use, and heavy drinking. In each case, we use a linear probability model with individual fixed effects. Table A19 shows that the use of hard drugs at time t is associated with a lower probability of employment in period $t+4$, $t+6$, and $t+8$. This holds in period $t+6$ even after we control for employment at time t. Heroin is actually not associated with a lower probability of employment in periods

[21] As the coefficients for the full sample and the African American sample are very close in magnitude, the lack of significance might simply be a small-sample-size problem.

[22] Again, the results when we restrict the sample to African American women are comparable in size to our full sample, but are no longer significant.

$t + 4$ and $t + 6$. However, as shown in Table A20, the use of heroin is negatively related with employment further out, in period $t + 8$. Again, this relationship holds even after we control for employment in period t. Interestingly, Table A21 shows that the reverse is true for the use of stimulants: employment at time t+4 and t+6 is negatively related to the use of stimulants in period t, even after controlling for employment in t. Never-the-less, there is no statistically significant relationship between stimulant use in t and employment in $t + 8$. Heavy drinking in time t has little relationship with the probability of employment, as shown in Table A22. This may be because it is easier to hide an addiction to alcohol than the other drugs considered. Taken together, evidence suggests that the use of drugs in time t is related to worse labor market outcomes in periods $t + 4$, $t + 6$, and $t + 8$. The relationships between drug use and future employment are interesting, but they do not say that there is a causal relationship between improved health, in this case through the introduction of HAART, and employment.

To examine the effect that human capital improvements affect labor market outcomes, we consider entry into employment as an alternate measure. We see very limited suggestive evidence of greater attachment to the labor market, in particular, a higher relative probability of entering employment. Table A23 shows how the salient group compared to HIV+ high CD4 count women and Table A24 shows our salient group compared to HIV− women. Although the coefficients are not significant, they do suggest that the salient group was more likely to enter employment after HAART than both control groups. In other words, women who face a positive health shock reduce their use of drugs, which is akin to an increase in investments in their human capital. Subsequently, they exhibit suggestive evidence of higher entry into employment.

Table A1: Differences in Differences for First and Second Cohort after Six Visits

	[1]	[2]	[3]	[4]	[5]
Full Sample					
Visit Six	-.086***	-.020	-.010	-.014	-.008
	(.022)	(.041)	(.053)	(.053)	(.051)
First cohort	.081***	.109***	.149***	.143***	.127***
	(.025)	(.028)	(.038)	(.037)	(.041)
Visit six × First cohort	.	-.084**	-.109**	-.106**	-.115**
		(.040)	(.051)	(.051)	(.048)
Obs.	695	695	676	676	676
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The sample is restricted to HIV+ women who answered questions about domestic violence. Basic controls include age at visit, age squared, age cubed, race (Caucasian omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include crack use, cocaine use, pot use, heroin use, smoking (never smoker omitted), drinking (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A2: Differences in Differences in Domestic Violence for Salient Group and HIV+ Low CD4 Count Women in the First Cohort using a Probit Specification

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.043***	-.033***	-.017**	-.010*	-.008
	(.007)	(.007)	(.007)	(.005)	(.005)
Salient Group	.004	.024**	.021*	.017*	.013
	(.008)	(.012)	(.011)	(.009)	(.008)
Salient × HAART	.	-.024***	-.022***	-.017***	-.015***
		(.008)	(.007)	(.006)	(.006)
Obs.	9319	9319	9319	9319	9319
African Americans					
HAART available	-.043***	-.025***	-.009	-.003	-.002
	(.009)	(.009)	(.008)	(.006)	(.006)
Salient Group	.008	.048***	.041**	.036***	.029**
	(.010)	(.018)	(.016)	(.014)	(.012)
Salient × HAART	.	-.038***	-.034***	-.026***	-.024***
		(.009)	(.007)	(.007)	(.006)
Obs.	5981	5981	5967	5967	5967
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Basic controls include age at visit, age squared, age cubed, and race (Caucasian omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline. The sample is restricted to HIV+ women with minimum CD4 count below 400 before the introduction of HAART who remained in the study at least 10 visits.

Table A3: Differences in Differences for Salient Group and HIV− Women in the First Cohort using a Probit Specification, Physical Abuse

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.040***	-.037***	-.027***	-.020**	-.017**
	(.008)	(.010)	(.009)	(.008)	(.007)
Salient Group	-.018***	-.014	-.012	-.011	-.008
	(.007)	(.009)	(.008)	(.007)	(.005)
Salient × HAART	.	-.006	-.005	-.004	-.002
		(.011)	(.009)	(.007)	(.007)
Obs.	6544	6544	6544	6544	6544
African Americans					
HAART available	-.042***	-.033***	-.033***	-.033***	-.033***
	(.010)	(.012)	(.012)	(.012)	(.012)
Salient Group	-.014*	-.002	-.002	-.002	-.002
	(.008)	(.011)	(.011)	(.011)	(.011)
Salient × HAART	.	-.017	-.017	-.017	-.017
		(.011)	(.011)	(.011)	(.011)
Obs.	4654	4654	4654	4654	4654
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Basic controls include age at visit, age squared, age cubed, and race (Caucasian omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include crack use, cocaine use, pot use, heroin use, smoking (never smoker omitted), drinking (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A4: Differences in Differences for Salient Group and High CD4 Count HIV+ Women in the First Cohort using a Probit Specification, Physical Abuse

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.015***	-.015**	-.015**	-.007*	-.007*
	(.005)	(.006)	(.006)	(.004)	(.004)
Salient Group	-.014***	-.014*	-.014*	-.010*	-.008
	(.005)	(.008)	(.008)	(.006)	(.005)
Salient × HAART	.	.00002	.001	.001	.0006
		(.009)	(.010)	(.007)	(.006)
Obs.	6430	6430	6430	6430	6430
African American					
HAART available	-.015**	-.012	-.012	-.012	-.012
	(.007)	(.007)	(.007)	(.007)	(.007)
Salient Group	-.013*	-.007	-.007	-.007	-.007
	(.007)	(.011)	(.011)	(.011)	(.011)
Salient × HAART	.	-.009	-.009	-.009	-.009
		(.010)	(.010)	(.010)	(.010)
Obs.	4525	4525	4525	4525	4525
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Basic controls include age at visit, age squared, age cubed, and race (Caucasian omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include crack use, cocaine use, pot use, heroin use, smoking (never smoker omitted), drinking (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A5: Differences in Differences for Salient Group and High CD4 Count Women in the First Cohort using a Probit Specification, Coercion

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.051***	-.039***	-.025**	-.014	-.014
	(.009)	(.011)	(.012)	(.010)	(.010)
Salient Group	-.019**	-.003	-.001	-.005	-.004
	(.009)	(.012)	(.014)	(.012)	(.011)
Salient × HAART	.	-.022**	-.025**	-.020*	-.020*
		(.011)	(.012)	(.011)	(.011)
Obs.	6652	6652	6652	6652	6652
African Americans					
HAART available	-.063***	-.048***	-.048***	-.048***	-.048***
	(.012)	(.015)	(.015)	(.015)	(.015)
Salient Group	-.019	-.0008	-.0008	-.0008	-.0008
	(.012)	(.016)	(.016)	(.016)	(.016)
Salient × HAART	.	-.026*	-.026*	-.026*	-.026*
		(.014)	(.014)	(.014)	(.014)
Obs.	4526	4526	4526	4526	4526
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Basic controls include age at visit, age squared, age cubed, and race (Caucasian omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include crack use, cocaine use, pot use, heroin use, smoking (never smoker omitted), drinking (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A6: Differences in Differences for Salient Group and HIV− Women in the First Cohort using a Probit Specification, Coercion

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.088***	-.095***	-.090***	-.077***	-.072***
	(.011)	(.015)	(.016)	(.015)	(.014)
Salient Group	-.021	-.029*	-.027	-.028*	-.022
	(.016)	(.017)	(.017)	(.015)	(.014)
Salient × HAART	.	.019	.017	.016	.021
		(.022)	(.022)	(.020)	(.019)
Obs.	3178	3178	3178	3178	3178
African Americans					
HAART available	-.083***	-.084***	-.084***	-.084***	-.084***
	(.014)	(.019)	(.019)	(.019)	(.019)
Salient Group	-.007	-.008	-.008	-.008	-.008
	(.019)	(.021)	(.021)	(.021)	(.021)
Salient × HAART	.	.004	.004	.004	.004
		(.025)	(.025)	(.025)	(.025)
Obs.	2240	2240	2240	2240	2240
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Basic controls include age at visit, age squared, age cubed, and race (Caucasian omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include crack use, cocaine use, pot use, heroin use, smoking (never smoker omitted), drinking (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A7: Differences in Differences for Salient Group and High CD4 Count Women in the First Cohort using a Probit Specification, Sexual Abuse

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.015***	-.015**	-.015**	-.007*	-.007*
	(.005)	(.006)	(.006)	(.004)	(.004)
Salient Group	-.014***	-.014*	-.014*	-.010*	-.008
	(.005)	(.008)	(.008)	(.006)	(.005)
Salient × HAART	.	.00002	.001	.001	.0006
		(.009)	(.010)	(.007)	(.006)
Obs.	6430	6430	6430	6430	6430
African Americans					
HAART available	-.015**	-.012	-.012	-.012	-.012
	(.007)	(.007)	(.007)	(.007)	(.007)
Salient Group	-.013*	-.007	-.007	-.007	-.007
	(.007)	(.011)	(.011)	(.011)	(.011)
Salient × HAART	.	-.009	-.009	-.009	-.009
		(.010)	(.010)	(.010)	(.010)
Obs.	4525	4525	4525	4525	4525
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Basic controls include age at visit, age squared, age cubed, and race (Caucasian omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include crack use, cocaine use, pot use, heroin use, smoking (never smoker omitted), drinking (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A8: Differences in Differences for Salient Group and HIV− Women in the First Cohort using a Probit Specification, Sexual Abuse

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.017***	-.019***	-.017**	-.014**	-.010**
	(.005)	(.006)	(.006)	(.006)	(.005)
Salient Group	-.005	-.008	-.009	-.007	-.005
	(.004)	(.006)	(.006)	(.005)	(.004)
Salient × HAART	.	.005	.005	.005	.003
		(.008)	(.007)	(.006)	(.005)
Obs.	6544	6544	6544	6544	6544
African Americans					
HAART available	-.018***	-.019**	-.019**	-.019**	-.019**
	(.007)	(.008)	(.008)	(.008)	(.008)
Salient Group	-.0002	-.0009	-.0009	-.0009	-.0009
	(.005)	(.008)	(.008)	(.008)	(.008)
Salient × HAART	.	.001	.001	.001	.001
		(.008)	(.008)	(.008)	(.008)
Obs.	4654	4654	4654	4654	4654
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Basic controls include age at visit, age squared, age cubed, and race (Caucasian omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include crack use, cocaine use, pot use, heroin use, smoking (never smoker omitted), drinking (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A9: Differences in Differences for Salient Group and High CD4 HIV+ Women in the First Cohort using a Probit Specification, Salient Group Definition 2

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.063***	-.050***	-.033**	-.020*	-.021*
	(.010)	(.013)	(.014)	(.012)	(.012)
Salient Group 2	-.026**	-.012	-.007	-.009	-.011
	(.011)	(.013)	(.015)	(.013)	(.013)
Salient 2 × HAART	.	-.019	-.023	-.017	-.016
		(.013)	(.015)	(.013)	(.013)
Obs.	6623	6623	6623	6623	6623
African Americans					
HAART available	-.080***	-.065***	-.044***	-.028**	-.027**
	(.013)	(.017)	(.016)	(.014)	(.013)
Salient Group 2	-.028*	-.013	-.006	-.011	-.014
	(.015)	(.018)	(.016)	(.014)	(.014)
Salient 2 × HAART	.	-.021	-.023	-.018	-.016
		(.017)	(.016)	(.014)	(.014)
Obs.	4246	4246	4246	4246	4246
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

Salient Group is defined as having a minimum pre HAART CD4 count between 300 and 450. The sample is restricted to women from the first cohort who answered questions about domestic violence. Basic controls include age at visit, age squared, age cubed, race (Caucasian omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include crack use, cocaine use, pot use, heroin use, smoking (never smoker omitted), drinking (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A10: Differences in Differences for Salient Group and HIV− Women in the First Cohort using a Probit Specification, Salient Group Definition 2

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.074***	-.075***	-.059***	-.044***	-.040***
	(.009)	(.013)	(.013)	(.011)	(.011)
Salient Group 2	-.013	-.014	-.011	-.013	-.011
	(.009)	(.011)	(.010)	(.009)	(.008)
Salient 2 × HAART	.	.001	.0005	.001	.004
		(.012)	(.012)	(.010)	(.010)
Obs.	7510	7510	7510	7510	7510
African Americans					
HAART available	-.076***	-.066***	-.044***	-.030**	-.024**
	(.012)	(.016)	(.015)	(.012)	(.011)
Salient Group 2	-.008	.002	.004	.0003	.002
	(.011)	(.014)	(.013)	(.011)	(.010)
Salient 2 × HAART	.	-.014	-.017	-.014	-.011
		(.016)	(.013)	(.011)	(.011)
Obs.	4913	4913	4913	4913	4913
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

Salient Group is defined as having a minimum pre HAART CD4 count between 300 and 450. The sample is restricted to women from the first cohort who answered questions about domestic violence. Basic controls include age at visit, age squared, age cubed, race (Caucasian omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include crack use, cocaine use, pot use, heroin use, smoking (never smoker omitted), drinking (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A11: Differences in Differences for Salient Group and High CD4 HIV+ Women in the First Cohort using a Probit Specification, Salient Group Definition 3

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.063***	-.049***	-.032**	-.020	-.022*
	(.010)	(.014)	(.015)	(.013)	(.013)
Salient Group 3	-.024*	-.012	-.006	-.007	-.011
	(.012)	(.015)	(.016)	(.014)	(.014)
Salient 3 × HAART	.	-.016	-.019	-.013	-.012
		(.014)	(.016)	(.014)	(.014)
Obs.	6623	6623	6623	6623	6623
African Americans					
HAART available	-.080***	-.067***	-.045***	-.028*	-.027**
	(.014)	(.018)	(.017)	(.014)	(.014)
Salient Group 3	-.032*	-.020	-.015	-.016	-.022
	(.016)	(.019)	(.018)	(.016)	(.015)
Salient 3 × HAART	.	-.016	-.017	-.015	-.013
		(.018)	(.017)	(.015)	(.014)
Obs.	4246	4246	4246	4246	4246
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

Salient Group is defined as having a minimum pre HAART CD4 count between 300 and 500. The sample is restricted to women from the first cohort who answered questions about domestic violence. Basic controls include age at visit, age squared, age cubed, race (Caucasian omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include crack use, cocaine use, pot use, heroin use, smoking (never smoker omitted), drinking (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A12: Differences in Differences for Salient Group and HIV− Women in the First Cohort using a Probit Specification, Salient Group Definition 3

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.073***	-.076***	-.059***	-.043***	-.040***
	(.009)	(.013)	(.013)	(.011)	(.011)
Salient Group 3	-.010	-.013	-.011	-.013	-.011
	(.009)	(.011)	(.010)	(.009)	(.008)
Salient 3 × HAART	.	.005	.004	.004	.007
		(.012)	(.012)	(.010)	(.010)
Obs.	8169	8169	8169	8169	8169
African Americans					
HAART available	-.075***	-.067***	-.045***	-.031***	-.026**
	(.012)	(.016)	(.014)	(.012)	(.011)
Salient Group 3	-.006	.0009	.001	-.002	-.002
	(.011)	(.014)	(.012)	(.011)	(.010)
Salient 3 × HAART	.	-.010	-.013	-.011	-.008
		(.015)	(.013)	(.011)	(.011)
Obs.	5311	5311	5311	5311	5311
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

Salient Group is defined as having a minimum pre HAART CD4 count between 300 and 500. The sample is restricted to women from the first cohort who answered questions about domestic violence. Basic controls include age at visit, age squared, age cubed, race (Caucasian omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include crack use, cocaine use, pot use, heroin use, smoking (never smoker omitted), drinking (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A13: Causal Effect of Health on Domestic Violence, using HAART as an Instrument

	Ever on HAART			Never on HAART		
	[1]	[2]	[3]	[1]	[2]	[3]
Logged cd4 count	-.139***	-.120***	-.111***	-.063	-.064	-.048
Age	-.032**	-.028*	-.022	-.068	-.072	-.068
Age squared	.0006*	.0005	.0004	.001	.001	.001
Age cubed	-3.69e-06	-3.12e-06	-2.06e-06	-8.40e-06	-8.70e-06	-7.95e-06
African American	-.002	-.0009	.003	-.021	.003	.013
Hispanic	-.017	-.019	-.007	-.025	-.017	.014
Other race	.033	.029	.040	.032	.030	.059
Yearly Income 6001-12000	.	-.021*	-.015	.	.006	.015
Yearly Income 12001-18000	.	-.020	-.010	.	.019	.037
Yearly Income 18001-24000	.	-.028	-.014	.	-.064	-.034
Yearly Income 24001-30000	.	-.038*	-.025	.	-.058	-.026
Yearly Income > 30000	.	-.041**	-.029	.	.013	.027
Employed	.	.006	.016	.	-.052	-.012
Yearly income 6001-12000, employed	.	.015	.010	.	.043	.028
Yearly income 12001-18000, employed	.	.007	.0007	.	-.045	-.068
Yearly income 18001-24000, employed	.	.004	-.002	.	.117*	.092
Yearly income 24001-30000, employed	.	.019	.011	.	.153	.123
Yearly income > 30000, employed	.	.013	.009	.	.025	.004
Married	.	.033***	.034***	.	.027	.036
Not married, lives with prtnr	.	.043***	.041***	.	.068**	.046
Widowed	.	.002	.009	.	-.029	-.007
Divorced/Annuled	.	.031**	.037***	.	.019	.045
Separated	.	.037***	.036***	.	-.024	-.009
Other Marital Status	.	.001	.008	.	.027	.026
Crack use	.	.	.029	.	.	.047
Cocaine use	.	.	.023	.	.	.011
Pot use	.	.	.049***	.	.	.047
Heroin use	.	.	-.040*	.	.	-.016
Current smoker	.	.	.036***	.	.	.033
Former smoker	.	.	.025**	.	.	.044
Light drinker	.	.	.008	.	.	-.004
Moderate drinker	.	.	.021*	.	.	.004
Heavy drinker	.	.	.041**	.	.	.161***
Male sex partners in last 6 mo	.	.	.0003	.	.	4.82e-06
Lives with kids at base line	.	.	-.006	.	.	-.023
Obs.	12138	12138	12138	1103	1103	1103

The sample is restricted to HIV+ women from the first cohort who answered questions about domestic violence. The omitted income category is less than $6000; Caucasian is the omitted race; never married is the omitted marital status; never smoker is the omitted smoking category; abstainer is the omitted drinking category. Site dummies are included in all specifications. Standard errors clustered by individual.

Table A14: Causal Effect of Health on Domestic Violence, using HAART as an Instrument, Salient Group

	[1]	[2]	[3]
CD4 count	-.001**	-.002*	-.002
Age	-.061	-.067	-.059
Age squared	.001	.001	.001
Age cubed	-8.39e-06	-8.28e-06	-5.93e-06
African American	-.053	-.026	-.029
Hispanic	-.081	-.062	-.053
Other race	.051	.129	.085
Yearly Income 6001-12000		-.090	-.081
Yearly Income 12001-18000		-.011	.012
Yearly Income 18001-24000		-.002	.011
Yearly Income 24001-30000		-.020	-.012
Yearly Income > 30000		-.010	.014
Employed		-.063	-.067
Yearly income 6001-12000, employed		.138	.162
Yearly income 12001-18000, employed		.087	.101
Yearly income 18001-24000, employed		.092	.115
Yearly income 24001-30000, employed		.066	.089
Yearly income > 30000, employed		.136	.146
Married		.040	.049
Not married, lives with prtnr		.040	.036
Widowed		.034	.042
Divorced/Annuled		.022	.018
Separated		-.104	-.094
Other Marital Status		.098	.098
Crack use			.002
Cocaine use			-.010
Pot use			-.020
Heroin use			.002
Current smoker			.085
Former smoker			.020
Light drinker			-.107
Moderate drinker			-.089
Heavy drinker			-.018
No. male sex prtnr SLV			-.002*
Lives with kids at base line			-.045
Obs.	2381	2381	2381

The sample is restricted to HIV+ women from the first cohort who answered questions about domestic violence with minimum pre-HAART CD4 counts between 300 and 399. The omitted income category is less than $6000; Caucasian is the omitted race; never married is the omitted marital status; never smoker is the omitted smoking category; abstainer is the omitted drinking category. Site dummies are included in all specifications. Standard errors clustered by individual.

Table A15: Differences in Differences for Salient Group and HIV+ High CD4 Count Women in the First Cohort using a Probit Specification, Use of Hard Drugs

	[1]	[2]	[3]	[4]
Full Sample				
HAART available	-.062***	-.044***	-.075***	-.033***
	(.010)	(.012)	(.016)	(.011)
Salient Group	-.021	.013	.020	.020
	(.018)	(.021)	(.022)	(.016)
Salient × HAART	.	-.040**	-.032*	-.024*
		(.016)	(.018)	(.013)
Obs.	15653	15653	15653	15653
African Americans				
HAART available	-.075***	-.055***	-.088***	-.046***
	(.014)	(.018)	(.020)	(.017)
Salient Group	-.014	.026	.039	.028
	(.026)	(.031)	(.030)	(.026)
Salient × HAART	.	-.045*	-.035	-.022
		(.023)	(.023)	(.021)
Obs.	8980	8980	8980	8980
Basic Controls	N	N	Y	Y
Demographic Controls	N	N	N	Y

Hard drugs are defined as having used crack, heroin, (illicit) methadone, or cocaine in the last six months. The salient group is defined as having a minimum pre-HAART CD4 count between 300 and 399. The sample is restricted to women from the first cohort. Basic controls include age at visit, age squared, age cubed, race (Caucasian omitted), and cite of visit (Chicago omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and income bin. Risky behavior controls include the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A16: Differences in Differences for Salient Group and HIV− Women in the First Cohort using a Probit Specification, Use of Hard Drugs

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.067***	-.046***	-.095***	-.045***	-.042***
	(.012)	(.015)	(.020)	(.016)	(.016)
Salient Group	-.059***	-.021	-.035	-.032	-.028
	(.020)	(.023)	(.024)	(.020)	(.020)
Salient × HAART	.	-.046**	-.039*	-.039**	-.040**
		(.019)	(.021)	(.018)	(.018)
Obs.	14321	14321	14321	14321	14321
African Americans					
HAART available	-.085***	-.065***	-.120***	-.068***	-.070***
	(.017)	(.021)	(.027)	(.023)	(.024)
Salient Group	-.061**	-.023	-.027	-.037	-.030
	(.028)	(.033)	(.032)	(.029)	(.029)
Salient × HAART	.	-.046*	-.041	-.036	-.036
		(.027)	(.028)	(.026)	(.026)
Obs.	8460	8460	8460	8460	8460
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

Hard drugs are defined as having used crack, heroin, (illicit) methadone, or cocaine in the last six months. The salient group is defined as having a minimum pre-HAART CD4 count between 300 and 399. The sample is restricted to women from the first cohort. Basic controls include age at visit, age squared, age cubed, race (Caucasian omitted), and cite of visit (Chicago omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and income bin. Risky behavior controls include the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A17: Differences in Differences in Heavy Drinking for Salient Group and High CD4 Count HIV+ Women in the First Cohort using a Probit Specification

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.040***	-.037***	-.037***	-.023***	-.014*
	(.007)	(.009)	(.011)	(.008)	(.007)
Salient Group	-.002	.002	.006	.006	.008
	(.009)	(.012)	(.013)	(.011)	(.010)
Salient × HAART	.	-.005	-.004	-.002	-.004
		(.009)	(.010)	(.009)	(.008)
Obs.	15587	15587	15587	15587	15587
African Americans					
HAART available	-.046***	-.041***	-.030***	-.018*	-.009
	(.010)	(.012)	(.011)	(.010)	(.008)
Salient Group	.009	.017	.020	.016	.017
	(.014)	(.019)	(.018)	(.016)	(.013)
Salient × HAART	.	-.010	-.009	-.005	-.006
		(.013)	(.012)	(.011)	(.009)
Obs.	8947	8947	8947	8947	8947
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

Heavy drinking is defined as having 14 or more drinks per week. The salient group is defined as having a minimum pre-HAART CD4 count between 300 and 399. The sample is restricted to women from the first cohort. Basic controls include age at visit, age squared, age cubed, race (Caucasian omitted), and cite of visit (Chicago omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and income bin. Risky behaviors include crack use, cocaine use, pot use, heroin use, cigarette smoking (never smoker omitted), alcohol use (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A18: Differences in Differences in Heavy Drinking for Salient Group and HIV− Women in the First Cohort using a Probit Specification

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.024***	-.010	-.024*	-.010	-.002
	(.007)	(.008)	(.012)	(.010)	(.008)
Salient Group	-.016	.010	.008	.006	.012
	(.010)	(.014)	(.017)	(.015)	(.013)
Salient × HAART	.	-.030***	-.034***	-.027**	-.023**
		(.010)	(.013)	(.011)	(.010)
Obs.	14264	14264	14264	14264	14264
African Americans					
HAART available	-.033***	-.017	-.031**	-.018	-.009
	(.011)	(.012)	(.015)	(.014)	(.011)
Salient Group	-.006	.022	.017	.012	.017
	(.016)	(.023)	(.020)	(.018)	(.016)
Salient × HAART	.	-.031**	-.028**	-.025**	-.019*
		(.014)	(.013)	(.013)	(.011)
Obs.	8434	8434	8434	8434	8434
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

Heavy drinking is defined as having 14 or more drinks per week. The salient group is defined as having a minimum pre-HAART CD4 count between 300 and 399. The sample is restricted to women from the first cohort. Basic controls include age at visit, age squared, age cubed, race (Caucasian omitted), and cite of visit (Chicago omitted). Demographic controls include income (less than $6000 omitted), employment status, marital status (never married omitted), and an interaction between employment and income bin. Risky behaviors include crack use, cocaine use, pot use, heroin use, cigarette smoking (never smoker omitted), alcohol use (abstainer omitted), the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A19: Employment and Hard Drug Use

	[1]	[2]	[3]	[4]
Employment at t+4				
Hard Drugs	-.034*	-.031	-.028	-.025
Employed at t	.	.156***	.	.153***
Age	.031	.023	.031	.023
Age squared	-.0003	-.0002	-.0003	-.0002
Age cubed	-8.95e-08	-5.32e-07	-7.28e-08	-4.66e-07
Married	.	.	-.005	-.011
Not married, lives with prtnr	.	.	.005	.001
Widowed	.	.	.076***	.058**
Divorced/Annuled	.	.	.019	.010
Separated	.	.	.021	.012
Other Marital Status	.	.	.038	.033
Male sex partners in last 6 mo	.	.	-.003***	-.003**
Obs.	4887	4887	4887	4887
Employment at t+6				
Hard Drugs	-.063***	-.061***	-.055***	-.053**
Employed at t	.	.081***	.	.079***
Age	.002	-.002	.002	-.002
Age squared	.0003	.0003	.0003	.0003
Age cubed	-4.56e-06	-4.83e-06	-4.45e-06	-4.67e-06
Married	.	.	.012	.007
Not married, lives with prtnr	.	.	.011	.008
Widowed	.	.	.064**	.055*
Divorced/Annuled	.	.	-.004	-.010
Separated	.	.	.008	.002
Other Marital Status	.	.	.033	.031
Male sex partners in last 6 mo	.	.	-.004***	-.004***
Obs.	4435	4435	4435	4435
Employment at t+8				
Hard Drugs	-.036*	-.035*	-.030	-.029
Employed at t	.	.027*	.	.023
Age	-.042	-.043	-.046*	-.047*
Age squared	.001**	.001**	.001**	.001**
Age cubed	-1.00e-05**	-1.00e-05**	-1.00e-05**	-1.00e-05**
Married	.	.	.030	.029
Not married, lives with prtnr	.	.	.021	.021
Widowed	.	.	.089***	.087***
Divorced/Annuled	.	.	.038	.037
Separated	.	.	.038	.036
Other Marital Status	.	.	.005	.005
Male sex partners in last 6 mo	.	.	-.004***	-.003***
Obs.	4022	4022	4022	4022

The sample is restricted to women in the salient group who answered questions about drug use and employment. The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Hard drugs are defined as crack, cocaine, methadone, or heroin. All specifications include individual fixed effects.

Table A20: Employment and Heroin Use

	[1]	[2]	[3]	[4]
Employment at t+4				
Used heroin SLV	-.008	-.007	-.006	-.005
Employed at t	.	.156***	.	.153***
Age	.030	.022	.030	.023
Age squared	-.0003	-.0002	-.0003	-.0002
Age cubed	-3.09e-07	-7.31e-07	-2.54e-07	-6.27e-07
Married	.	.	-.005	-.012
Not married, lives with prtnr	.	.	.005	.002
Widowed	.	.	.075***	.058**
Divorced/Annuled	.	.	.018	.009
Separated	.	.	.022	.012
Other Marital Status	.	.	.038	.033
Male sex partners in last 6 mo	.	.	-.003***	-.003**
Obs.	4887	4887	4887	4887
Employment at t+6				
Used heroin SLV	-.044	-.044	-.041	-.041
Employed at t	.	.082***	.	.080***
Age	.002	-.003	.002	-.002
Age squared	.0003	.0004	.0003	.0003
Age cubed	-4.66e-06	-4.92e-06	-4.51e-06	-4.71e-06
Married	.	.	.010	.006
Not married, lives with prtnr	.	.	.012	.008
Widowed	.	.	.062**	.053*
Divorced/Annuled	.	.	-.006	-.012
Separated	.	.	.009	.003
Other Marital Status	.	.	.035	.033
Male sex partners in last 6 mo	.	.	-.004***	-.004***
Obs.	4435	4435	4435	4435
Employment at t+8				
Used heroin SLV	-.063**	-.062**	-.060**	-.060**
Employed at t	.	.027*	.	.024
Age	-.040	-.041	-.044	-.044
Age squared	.001*	.001*	.001**	.001**
Age cubed	-1.00e-05**	-1.00e-05**	-1.00e-05**	-1.00e-05**
Married	.	.	.029	.028
Not married, lives with prtnr	.	.	.022	.021
Widowed	.	.	.088***	.085***
Divorced/Annuled	.	.	.038	.036
Separated	.	.	.039	.037
Other Marital Status	.	.	.007	.006
Male sex partners in last 6 mo	.	.	-.004***	-.004***
Obs.	4022	4022	4022	4022

The sample is restricted to women in the salient group who answered questions about drug use and employment. The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. All specifications include individual fixed effects.

Table A21: Employment and Stimulant Use

	[1]	[2]	[3]	[4]
Employment at t+4				
Stimulants	-.048**	-.042**	-.041**	-.036*
Employed at t	.	.155***	.	.152***
Age	.032	.024	.031	.024
Age squared	-.0004	-.0002	-.0004	-.0003
Age cubed	-5.33e-09	-4.62e-07	1.12e-08	-3.96e-07
Married	.	.	-.004	-.011
Not married, lives with prtnr	.	.	.005	.001
Widowed	.	.	.076***	.059**
Divorced/Annuled	.	.	.019	.010
Separated	.	.	.021	.011
Other Marital Status	.	.	.037	.033
Male sex partners in last 6 mo	.	.	-.003***	-.003**
Obs.	4887	4887	4887	4887
Employment at t+6				
Stimulants	-.067***	-.064***	-.058***	-.056***
Employed at t	.	.081***	.	.079***
Age	.002	-.002	.002	-.002
Age squared	.0003	.0003	.0003	.0003
Age cubed	-4.55e-06	-4.83e-06	-4.44e-06	-4.66e-06
Married	.	.	.012	.008
Not married, lives with prtnr	.	.	.011	.008
Widowed	.	.	.064**	.055*
Divorced/Annuled	.	.	-.004	-.010
Separated	.	.	.007	.001
Other Marital Status	.	.	.033	.030
Male sex partners in last 6 mo	.	.	-.004***	-.004***
Obs.	4435	4435	4435	4435
Employment at t+8				
Stimulants	-.035	-.034	-.028	-.027
Employed at t	.	.026*	.	.023
Age	-.042	-.043	-.046*	-.047*
Age squared	.001**	.001**	.001**	.001**
Age cubed	-1.00e-05**	-1.00e-05**	-1.00e-05**	-1.00e-05**
Married	.	.	.030	.029
Not married, lives with prtnr	.	.	.021	.021
Widowed	.	.	.089***	.087***
Divorced/Annuled	.	.	.038	.037
Separated	.	.	.038	.036
Other Marital Status	.	.	.005	.004
Male sex partners in last 6 mo	.	.	-.004***	-.003***
Obs.	4022	4022	4022	4022

The sample is restricted to women in the salient group who answered questions about drug use and employment. The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Stimulants are defines as cocaine and crack. All specifications include individual fixed effects.

Table A22: Employment and Heavy Drinking

	[1]	[2]	[3]	[4]
Employment at t+4				
Heavy Drinker	-.041	-.037	-.035	-.032
Employed at t	.	.157***	.	.154***
Age	.030	.022	.029	.022
Age squared	-.0003	-.0002	-.0003	-.0002
Age cubed	-4.47e-07	-9.06e-07	-3.92e-07	-7.99e-07
Married	.	.	-.003	-.010
Not married, lives with prtnr	.	.	.005	.001
Widowed	.	.	.078***	.060**
Divorced/Annuled	.	.	.018	.009
Separated	.	.	.019	.010
Other Marital Status	.	.	.039	.034
Male sex partners in last 6 mo	.	.	-.003***	-.003**
Obs.	4867	4867	4867	4867
Employment at t+6				
Heavy Drinker	.014	.017	.022	.025
Employed at t	.	.082***	.	.080***
Age	-.003	-.007	-.003	-.007
Age squared	.0004	.0005	.0004	.0004
Age cubed	-5.41e-06	-5.72e-06	-5.27e-06	-5.52e-06
Married	.	.	.008	.003
Not married, lives with prtnr	.	.	.009	.006
Widowed	.	.	.066**	.057*
Divorced/Annuled	.	.	-.006	-.011
Separated	.	.	.004	-.002
Other Marital Status	.	.	.035	.032
Male sex partners in last 6 mo	.	.	-.004***	-.004***
Obs.	4412	4412	4412	4412
Employment at t+8				
Heavy Drinker	.025	.026	.032	.033
Employed at t	.	.026*	.	.023
Age	-.050*	-.051*	-.053*	-.054**
Age squared	.001**	.001**	.001**	.001**
Age cubed	-1.00e-05***	-1.00e-05***	-1.00e-05***	-1.00e-05***
Married	.	.	.024	.022
Not married, lives with prtnr	.	.	.023	.022
Widowed	.	.	.084***	.082***
Divorced/Annuled	.	.	.031	.030
Separated	.	.	.031	.029
Other Marital Status	.	.	.004	.003
Male sex partners in last 6 mo	.	.	-.004***	-.004***
Obs.	3998	3998	3998	3998

The sample is restricted to women in the salient group who answered questions about drug use and employment. The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Heavy drinking is defined as drinking 14 or more drinks a week. All specifications include individual fixed effects.

Table A23: Differences in Differences for Salient Group and High CD4 Count HIV+ Women in the First Cohort using a Probit Specification, Probability of Becoming Employed

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.018***	-.021***	-.005	-.005	-.007
	(.005)	(.005)	(.005)	(.005)	(.005)
Salient Group	-.017***	-.025***	-.022***	-.022***	-.022***
	(.005)	(.008)	(.008)	(.008)	(.008)
Salient × HAART	.	.012	.009	.010	.009
		(.011)	(.011)	(.011)	(.011)
Obs.	24502	24502	24502	24502	24502
African Americans					
HAART available	-.017***	-.021***	-.003	-.003	-.006
	(.006)	(.007)	(.007)	(.007)	(.007)
Salient Group	-.020***	-.034***	-.029***	-.030***	-.030***
	(.006)	(.010)	(.010)	(.010)	(.010)
Salient × HAART	.	.022	.015	.016	.017
		(.015)	(.014)	(.014)	(.014)
Obs.	14393	14393	14393	14393	14393
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Basic controls include age at visit, age squared, and age cubed. Demographic controls include marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A24: Differences in Differences for Salient Group and HIV− Women in the First Cohort using a Probit Specification, Probability of Becoming Employed

	[1]	[2]	[3]	[4]	[5]
Full Sample					
HAART available	-.020***	-.025***	-.009	-.009	-.010
	(.006)	(.008)	(.007)	(.007)	(.007)
Salient Group	-.026***	-.037***	-.032***	-.031***	-.031***
	(.005)	(.010)	(.009)	(.009)	(.009)
Salient × HAART	.	.014	.010	.011	.011
		(.012)	(.011)	(.011)	(.010)
Obs.	14474	14474	14474	14474	14474
African Americans					
HAART available	-.013*	-.020*	-.0006	-.0002	-.002
	(.008)	(.010)	(.009)	(.009)	(.009)
Salient Group	-.022***	-.035***	-.028**	-.029**	-.029**
	(.006)	(.013)	(.012)	(.012)	(.012)
Salient × HAART	.	.017	.010	.011	.011
		(.015)	(.014)	(.014)	(.014)
Obs.	8579	8579	8579	8579	8579
Basic Controls	N	N	Y	Y	Y
Demographic Controls	N	N	N	Y	Y
Risky Behavior Controls	N	N	N	N	Y

The salient group is defined as having a minimum pre HAART CD4 count between 300 and 400. Basic controls include age at visit, age squared, and age cubed. Demographic controls include marital status (never married omitted), and an interaction between employment and marital status. Risky behavior controls include the number of male sex partners in the last six months, and a dummy for the woman living with kids at baseline.

Table A25: Employment and Drug Use with Fixed Effects

	[1]	[2]	[3]	[4]	[5]	[6]
Hard Drugs	-.034***	-.030***	-.026***	-.024**	-.026***	-.027***
Employed	.	.093***	.	.034***	.	-.003
Age	.084***	.078***	.069***	.067***	.042***	.042***
Age squared	-.002***	-.001***	-.001***	-.001***	-.0007**	-.0007**
Age cubed	8.07e-06***	7.86e-06***	6.15e-06**	6.07e-06**	1.74e-06	1.74e-06
Obs.	20963	20963	21032	21032	22051	22051

The dependent variable for columns 1 and 2 is employment 4 visits out.
The dependent variable for columns 3 and 4 is employment 6 visits out.
The dependent variable for columns 5 and 6 is employment 8 visits out.
Hard drugs are defined as having used crack, methadone, heroin, or cocaine in the last six months. The sample is restricted to HIV+ women from the first cohort. Individual level fixed effects are included.