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## Self-Reevaluation as a Critical Component in Sustained Viral Load Change for HIV+ Adults with Alcohol Problems

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### Abstract

Self-reevaluation is one of the ten processes of change in the transtheoretical model and involves cognitive reappraisal of how behavior change is part of one's identity. Although self-reevaluation is a critical motivator for individuals in the contemplation stage of change, few studies have examined its impact on disease progression associated with sustained behavior change. This study investigated the contribution of self-reevaluation on sustained viral load improvement among 143 participants in a randomized controlled trial testing an eight-session intervention (Project Positive Living through Understanding and Support) designed to improve treatment adherence among HIV+ adults with alcohol problems. Participants' self-reevaluation scores at 3 months emerged as significant and independent predictors of sustained improvement in viral load at 6 months, over and above self-reported HAART dose adherence ( $p < 0.05$ ). Results underscore the role of self-reevaluation as a critical factor in behavioral interventions and highlight its role in sustained change necessary to slow disease progression.

### Keywords

HIV; Alcohol; Self-reevaluation; Viral load

### Introduction

Encouraging sustained highly active antiretroviral therapy (HAART) adherence has inspired a multitude of behavioral and cognitive interventions that have relied heavily on the transtheoretical model (TTM) as a framework. Interventions that focus on the TTM, specifically how processes of change can be cultivated and/or manipulated to produce

movement along the stages of the change cycle, have been very effective to understanding further what motivates a person to change and sustain that change [1–3]. The purpose of this paper was to investigate the critical role that self-reevaluation, one of the TTM processes of change, played in sustaining viral load improvement at 6 months for HIV+ individuals currently using HAART and classified as hazardous drinkers. The focus on self-reevaluation as the process of change of interest is situated in the fact that it is the cognitive reappraisal of the extent to which a behavior change is part of one's identity and this immensely introspective process is often credited with being *the* critical motivator to increase someone's readiness for change [4,5]. The relationship between self-reevaluation and behavior change in the context of problem drinking has theoretical roots in the self-concept literature. In Corte's [6] review of the literature on self-concept and alcohol dependency, perceptions of self as an alcoholic are found to be directly related to drinking and recovery. Individuals with inadequate perceptions of self are presumed to be drinking to cope with the "inner emptiness" they may struggle with. The act of drinking becomes integrated into the self schema and only when a new self that does not involve alcohol is constructed can recovery be maintained. The process of reconstructing the self is mimicked in the self-reevaluation process.

Carr [4] suggests that self-reevaluation is the necessary process of change for individuals to transition from a contemplation or nonaction-oriented stage to a more action-oriented stage such as preparation or action in the TTM cycle. Riley et al. [2] found that low-income women who struggled with stress management were more likely to report thoughts that could be classified as self-reevaluative when they were in the earlier stage of contemplation. A similar result was found for women contemplating eating more fruit and vegetables [7]. Motivation to change substance use behavior is directly "linked to the discrepancies between substance use and self-standards" [5].

Downey et al. state that the awareness of a discrepancy between self and behavior is more likely to contribute to sustained behavioral change. The research on how motivation for behavior change is related to the need for identity or life preservation is vital in working with substance users living with a chronic condition, such as HIV. Suppressing the progression of HIV into AIDS is a major focus for individuals living with HIV and is in direct conflict with consistent and hazardous alcohol use.

Problems related to alcohol use are more prevalent in HIV+ patients than in the general population [8]. However, there are inconsistent findings regarding the direct effect alcohol may have on viral load for HIV+ persons [9,10]. Preliminary research on alcohol and its role in HIV progression focuses on the immunosuppressant qualities it might possess, but this finding has not been consistently replicated [9]. Recent research [11–13] has indicated that the relationship between alcohol and viral load is a mediational one. Specifically, alcohol strongly contributes to liver decomposition [10], other diseases, and the "exacerbation of frailty" [13]. One of the most significant ways in which alcohol may influence HIV disease progression is through its negative influence on medication adherence [12]; this can affect viral load.

Since the 1990s, HAART has been credited with inhibiting HIV viral replication [14]. HAART's effectiveness is rooted in near perfect adherence to complex medicinal routines. Unfortunately, the co-occurrence of alcohol abuse and HIV presents a daunting context for strict and consistent HAART treatment adherence. The abuse of alcohol is one of the main behavioral challenges in adherence to HAART treatment among persons living with HIV. In other studies, alcohol has been shown to be the most significant predictor of adherence [15, 16].

## Current Research

Project Positive Living through Understanding and Support (PLUS) is an eight-session, manual-driven, individual intervention that integrates motivational interviewing with cognitive behavioral therapy, designed to reduce alcohol abuse and increase HAART adherence for adult HIV+ men and women. The intervention also integrated elements of the TTM, particularly in terms of the motivational interviewing (MI) elements, and therapists were trained on the use of processes of change, as outlined by the TTM. Project PLUS found that alcohol abuse was a significant risk factor for poor medication adherence among hazardous drinkers [17] and Project PLUS is one of the few behavioral interventions to demonstrate significant improvement in treatment vs. control on both biological (i.e., viral load) and behavioral measures of adherence [18]. However, consistent with findings reported in many behavioral interventions [19,20], treatment effects were not sustained at 6 months. Participants in the intervention condition continued to show improvement in viral load and reported adherence compared to those in the control condition, but these results were not statistically significant.

As a follow-up to this finding, the current study seeks to examine specific elements of the PLUS intervention that may be associated with sustained viral load improvement, viewed as the best indicator of HIV-related health. The mechanism of interest is a particular process of change, self-reevaluation, which involves cognitive reappraisal of the extent to which a behavior change is part of one's identity and is frequently cited in previous research as significantly contributing to behavior change. Through self-reevaluation, a person cognitively wrestles with the degree to which his or her behaviors (or abstinence from those behaviors) is congruent with his or her sense of self.

Although self-reevaluation is recognized as a critical motivator for individuals during the transition from contemplation to the preparation stage in changing a variety of target behaviors and health outcomes, few studies have examined its impact on sustained viral load improvement for people living with HIV. The study of self-discrepancy in the form of self-reevaluation may further shed light on how increasing awareness around the conflicting consequences of alcohol use and the desire for prolonging life can produce sustained changes in the form of biological markers of disease progression such as viral load. The current study aim was to determine whether or not self-reevaluation contributed to sustained viral load improvement at 6 months regardless of participation in the intervention or education condition of Project PLUS for HIV+ hazardous drinkers currently using HAART.

## Methods

### Study Participants

Secondary data analysis was conducted on participants enrolled in the PLUS randomized control trial. Detailed information regarding recruitment and exclusion criteria can be found in [18]. Briefly, from July 2002 through August 2005, 143 HIV+ hazardous drinkers were recruited through a variety of strategies, including flyers placed in clinic waiting rooms and active recruitment at HIV-related community events throughout the New York City area. Inclusion criteria are identical to those used in the above cited outcomes paper and include being HIV-positive, at least 18 years of age, English speaking, currently taking a HAART regimen, and meeting criteria for hazardous drinking (16 standard drinks per week for men or 12 standard drinks per week for women [21]) and having alcohol problems greater than those associated with other drugs. As a result of these criteria, a total number of 143 participants were included in the analyses. All study participants gave written informed consent, and all study procedures were reviewed and approved by the Institutional Review Board of Hunter College.

## Study Design and Procedures

All eligible participants were assigned to an eight-session intervention that incorporated motivational interviewing and cognitive behavior therapy or to an eight-session educational comparison condition, matched to the intervention for time and content. Both conditions focused on reducing alcohol behavior, which was considered a mediating factor for HAART adherence. See Parsons et al. [18] for detailed information regarding intervention study design.

## Quantitative Assessments

All participants underwent interviews at baseline, 3 months, and 6 months, which were intended to examine sociodemographic and biopsychosocial variables such as adherence, recent alcohol use, regimen characteristics, motivation to change current behavior, and viral load. Viral load was the primary biological outcome because it is more indicative of disease progression and adherence, in comparison to CD4 count, which is an immunological marker that could be influenced by non-HIV factors. The majority of the assessment was completed on an audio computer-assisted self-interview (ACASI) in which the participant responded to questions on a computer screen that they could either read or listen to with headphones. ACASI has been found to be an effective interview method for people of diverse educational backgrounds by providing audio assistance, thereby eliminating the effects that reading ability has on internal validity [22]. Recent studies have shown that ACASI increases the proportion of individuals truthfully endorsing drug use [23] because ACASI allows greater respondent privacy and removes barriers to honest responding, such as embarrassment, feedback from facial expressions of the interviewer, and other social influences [22]. Each interview lasted about 3 h and subjects were paid \$30 per interview.

## Measures

The primary measures for this study were biological and self-report measures of adherence as well as self-reevaluation.

**Biological**—All blood draws were conducted on-site by a certified phlebotomist and were analyzed by Specialty Laboratories. HIV viral load was measured by reverse transcriptase polymerase chain reaction using the HIV-1 Ultraquant assay (Specialty Laboratories, Santa Monica, CA, USA), and results were log-transformed to adjust for skew.

**Alcohol**—Participants were asked how many drinks they consumed in the last 14 days using the timeline follow-back technique for assessing past alcohol consumption outlined by Sobell and Sobell [24]. The number of drinks reported was then summarized into a single variable.

**Adherence**—Adherence was assessed using a timeline follow-back interview to recall, day by day, all medication doses taken and missed during the past 2 weeks. A period of 14 days was used to capture 2 weeks of weekday and weekend activity. Before the timeline follow-back, participants explained their HAART regimen and reported the number of scheduled dosing times for each medication per day. To control for differences among participants' regimens, percent dose adherence was defined as the number of doses taken in the past 14 days divided by the number of scheduled doses during that period. For each participant, an adherent day was defined as a day in which the participant missed none of his or her scheduled doses.

**Processes of Change: Self-reevaluation**—The Processes of Change Questionnaire (20-items) was used to assess cognitive and motivational aspects of decision-making regarding alcohol use [25]. The two items corresponding to self-reevaluation were summed and used in the following analyses: "I consider that feeling good about myself includes changing my drinking behavior" and "I think about the type of person I will be if I control my drinking."

Items were assessed on a scale of 1 (*never*) to 5 (*repeatedly*). The alpha for this subscale was 0.74.

### Data Analytic Plan

One-way ANOVAs were conducted to examine the relationship between condition (intervention or education) and log viral load improvement at 6 months, self-reevaluation at 3 months, and change (i.e., improvement) from baseline to 3 months for self-reevaluation. Pearson's product moment  $r$  and point biserial  $r$  tests were conducted to assess correlations between log viral load improvements and other variables of interests: condition, self-reevaluation; the change from baseline to 3 months for self-reevaluation; mean number of drinks in the past 14 days at 6 months; and HAART dose adherence difference from baseline to 6 months. Finally, a hierarchical linear regression analysis, which was informed by the results of bivariate analyses, was conducted to predict log viral load improvement at 6 months based on self-reevaluation scores at 3 months over and above condition and change in dose adherence.

## Results

### Sample Characteristics

One-hundred and forty-three participants classified as hazardous drinkers were included in the following analyses: The majority of the sample was male (79.7%) and African American (64.7%). The age range for the sample was from 26 years of age to 61 years of age; slightly more than half (51.7%) of the sample was between the ages of 36 and 45. Refer to Table 1 for complete sample demographics.

The average for self-reevaluation at 3 months was 3.42 (SD=1.11). The information for dose adherence difference from baseline to 6 months, and mean number of drinks in the past 14 days reported at 6 months can be found at the bottom of Table 2.

### Bivariate Analyses by Intervention Condition

One-way ANOVAs indicated no significant difference between the intervention condition and the education condition with regards to viral load improvement at 6 months and self-reevaluation at 3 months. However, there was a significant intervention effect for the change in self-reevaluation from baseline to 3 months ( $F(1, 116) = 8.75, p = 0.004$ ), such that the therapy condition ( $M = 0.66; SD = 0.93$ ) reported greater change in self-reevaluation scores compared to the education condition ( $M = 0.10; SD = 1.07$ ).

### Bivariate Analyses of Model Variables

Log viral load improvement at 6 months was related to dose adherence difference from baseline to 6 months ( $r = 0.21, p < 0.05$ ) and self-reevaluation scores at 3 months ( $r = 0.25, p < 0.05$ ). Mean number of drinks in the past 14 days at 6 months was not related to log viral load improvement at 6 months; however, mean standard number of drinks at 3 months was. See Table 2 for complete correlations as well as the corresponding means and standard deviations.

### Regression Analyses

A hierarchical regression controlling for both condition and adherence and testing for the mediation of self-reevaluation at 3 months by mean standard number of drinks in the past 14 days at 3 months was run. The mediation was not significant ( $R^2$  change was 0.03,  $p = 0.10$ ), and the effect of self-reevaluation with regards to viral load improvement was not sustained. To test the assumption that the results of this four-step model are a function of shared variance between self-reevaluation and drinking behavior, two partial correlations were run. When drinking was controlled for, the correlation between self-reevaluation and viral load

improvement maintained significance ( $r=0.22$ ,  $p=0.03$ ); the relationship between drinking and viral load improvement was not maintained when self-reevaluation was controlled for. Given the findings that mean standard number of drinks does not significantly contribute to the model, a more parsimonious model, which did not include this variable, was run.

Another hierarchical linear regression analysis, using simultaneous entry at each step, was conducted to evaluate the role self-reevaluation plays in contributing to sustained log viral load improvement at 6 months over and above intervention condition and HAART dose adherence difference from baseline to 6 months (see Table 3). Self-reevaluation significantly contributed to log viral load improvement in the third and final step and accounted for an additional 5% of the variance in viral load improvement at 6 months. As expected from bivariate analyses and previous findings, condition had no effect on 6-month viral load improvement for this sample. Dose adherence difference from baseline to 6 months did significantly predict sustained viral load improvement. However, the coefficient for dose adherence did not remain significant once self-reevaluation was added to the model. The final model yielded an  $R$  of 0.30 and an  $R^2$  that explained 9% of the variance.

## Discussion

The current research highlights the importance of self-reevaluation. For hazardous drinking HIV+ persons, regardless of participation in either the intervention or series of educational sessions, actively engaging in some amount of cognitive reappraisal of behaviors contributed to sustained viral load improvement at 6 months. It is important to note that there was a greater change in self-reevaluation in the therapy condition when compared to the education condition over the intervention period. This finding suggests that the integration of motivational interviewing and cognitive behavioral therapy was effective in facilitating more cognitive reappraisal.

Previous research [5,26–28] has found that a person's motivation to change and readiness to change are entrenched within the individual's conscious awareness of the consequences of their current behavior or abstinence of behavior. Even if the person did not alter his or her drinking behavior, engaging in self-reevaluation may have increased the person's awareness that his or her drinking is problematic. For this sample, the amount of alcohol consumed at 3 months was inversely related to viral load improvement over a 6-month period; alcohol consumed at 6 months was not. However, this relationship did not uniquely contribute to the prediction of viral load improvement when other factors (i.e., self-reevaluation) were accounted for. It is also possible that encouraged self-reflection on one particular aspect of problem behavior illuminate other behaviors that could be improved upon such as adherence, which contributed to viral load improvement. This supports a possible argument that although a reduction in drinking is a desired outcome, it is not the key determinant of sustained viral load improvement, which is critical to slowing disease progression.

The major finding for this study is that the amount of self-reevaluation at the conclusion of the 3-month session period was an independent predictor of log viral load improvement at 6 months. Simply stated, the more reappraisal a person does of his or her behavior and how he or she sees himself or herself, the greater the improvement in viral load at 6 months. This finding supports the belief that transition from the contemplation stage to preparation and ultimately the action stage takes place within a 6-month period once a person begins to actively engage in self-reevaluation [4]. The independent contribution of self-reevaluation at 3 months on sustained viral load also supports the consistent relationship between the self-concept and drinking, such that a change in the way a person sees himself or herself in regards to drinking can have more lasting effects than just a reduction in the problematic behavior.

Through both the intervention and education sessions, participants in this study were encouraged to reduce their drinking. Engaging in self-reevaluation suggests that participants may have been more cognizant of how their drinking was contributing to low adherence. The process of self-reevaluation with regards to sustained viral load improvement for hazardous drinkers is an important finding for practitioners working with patients that are struggling with substance abuse issues and living with HIV. Equally important is the finding that the PLUS intervention did create more change in self-reevaluation than the education condition. Again, self-reevaluation is a critical process to facilitate change within 6 months, and there appears to be an optimal amount for the transition to take place. Through Project PLUS, participants were given the tools to obtain the critical level of self-reevaluation needed, regardless of their starting place at the beginning of the intervention study trial.

Interventions that address the co-occurrence of alcohol abuse and adherence should also be mindful of specific populations that are most at risk for the combined effects of alcohol and HIV. Alcohol-related problems and HIV infection rates reflect the growing trends in health disparities among White, Black, and Hispanic Americans. According to the Centers for Disease Control, in 2006, Black Americans had an incidence rate of HIV that was seven times higher than that of the rate for Whites [29]. Mulia et al. [30] found that although African Americans and Hispanic drinkers had lower rates of alcohol use, they had higher rates of alcohol dependence. These findings were based on secondary data analysis of the National Alcohol Survey. Few studies have addressed adherence and how to increase it within the context of alcohol abuse for racial minority populations. The current sample was close to 85% minority. Future research should investigate how cultural factors and experiences may also contribute to barriers for dose adherence, increase hazardous drinking, and ultimately limit viral load improvement. Cultural factors may also provide an interesting context to study the development and expression of self-reevaluation.

A limitation of the current study was the fact that processes of change information was not captured at 6 months (i.e., 3 months after intervention sessions were completed). Although the findings indicate that self-reevaluation at the end of the intervention period (3 months) was a significant predictor of sustained viral load improvement at 6 months, the effect of this process of change may have dwindled at 6 months due to lack of exposure to engage in self-reevaluation. Future studies should examine processes of change information longitudinally which will create an opportunity to investigate whether or not levels of self-reevaluation at the conclusion of the intervention are sustained or increased after the intervention period concludes. Finally, this sample was restricted to individuals with drinking problems. Future analyses should consider the relevance of this model for participants whose alcohol problems were not severe enough to be considered hazardous drinkers. Self-reevaluation is a critical component in a person's motivation and or readiness to change. However, the process of self-reevaluation may function best with persons who have an easily identifiable problem that clearly interferes with their health.

Behavior change is a complex process that is assisted and inhibited by a variety of different factors. The current findings point to the importance of engaging in behavior that upholds a person's image of his or her self. In the context of this study, drinking that leads to poor adherence is in complete conflict with the desire to take medication which prevents the progression of HIV, thus sustaining life and ultimately the self. Behavior that is incongruent with a person's perception of self is not maintained when made conscious. Therefore, an opportunity for self-reflection can be a powerful motivator for generating change.

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**Table 1**Sample demographics ( $N=143$ )

	<b>Number</b>	<b>Percent</b>
Age		
26–35	17	11.9
36–45	74	51.7
46–55	44	30.8
56+	8	5.6
Race and ethnicity		
African American	90	64.7
White	8	5.8
Hispanic/Latino	27	19.4
Other	14	10.1
Gender		
Male	114	79.7
Female	29	20.3

**Table 2**

Correlates and descriptors of log viral load improvement baseline to 6 months (N=143)

	1	2	3	4	5	6	7	8
	<i>n</i> =115	<i>n</i> =118	<i>n</i> =118	<i>n</i> =107	<i>n</i> =98	<i>n</i> =110	<i>n</i> =101	<i>n</i> =95
1. Viral load improvement BL—6 months								
2. Condition (1 = intervention)	-0.07							
3. Self-reevaluation at 3 months	0.26*	0.16						
4. Dose adherence difference BL—6 months	0.21*	0.09	0.10					
5. Percent dose adherence at 3 months	0.01	0.08	0.08	0.05				
6. Percent dose adherence at 6 months	0.14	0.09	-0.05	0.64*	0.38*			
7. Mean standard drinks in past 14 days at 3 months	-0.20*	-0.06	-0.12	-0.04	0.02	0.06		
8. Mean standard drinks in past 14 days at 6 months	-0.18	-0.10	-0.14	-0.14	0.38*	-0.30*	0.38*	
<i>M</i>	0.30	3.46	0.08	0.91	0.89	1.90	1.96	
<i>SD</i>	0.46	0.93	0.29	0.21	0.24	4.00	3.22	

\* *p*<0.05

**Table 3**  
 Predicting log viral load improvement from BL to 6 months from self-reevaluation at 3 months (N=95)

	Condition	B	Beta	95% CI	Dose adherence	B	Beta	95% CI	Self-reevaluation	B	Beta	95% CI
Model F	0.02				2.08				3.03*			
df	94				93				92			
R	0.02				0.21				0.30			
R <sup>2</sup> change	0.00				0.04*				0.05*			
R <sup>2</sup>	0.00				0.04				0.09			
Constant		0.34***		0.21-0.47		0.33***		0.20-0.45		0.13		-0.30-0.32
Condition		-0.01	-0.02	-0.21-0.18		-0.04	-0.04	-0.23-0.16		-0.70	-0.07	-0.26-0.12
Dose adherence difference BL-6 months						0.33*	0.21	-0.01-0.64		0.30	0.19	-0.02-0.61
Self-reevaluation at 3 months										0.10*	0.22	0.01-0.19

Sample size due to attrition at 3 months

\*  $p < 0.05$ ;

\*\*\*  $p < 0.001$