An Initial Open Trial of a Brief Behavioral Activation Treatment for Depression and Medication Adherence in HIV-Infected Patients

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Abstract
Advances in HIV treatment through highly active antiretroviral therapy (HAART) have led to a steady decline in HIV-related mortality rates. However, HAART requires adherence to strict and often complicated medication regimens, and nonadherence to HAART can significantly decrease its effectiveness. Depression has consistently shown a robust association with medication nonadherence; consequently, numerous psychological interventions have been developed to target depression and increase medication adherence among HIV-infected individuals. The length of these interventions, however, may be prohibitive for certain HIV-infected populations, such as patients in rural areas. Therefore, this study provides an initial investigation of a one-session behavioral activation treatment for depression designed specifically for HIV-infected patients (BATD-HIV) at a community infectious disease clinic

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serving a largely rural population. In this initial uncontrolled open trial, BATD-HIV was administered to 10 HIV-infected patients with elevated symptoms of depression following their clinic appointment. Depression, anxiety, and stress symptom severity; behavioral activation processes; medication adherence; and CD4 T-cell count were assessed pre- and 1 month postintervention. Participants exhibited significant reductions in anxiety symptom severity and avoidance of negative aversive states and rumination from pre- to 1 month posttreatment. Although nonsignificant, participants also showed medium effect size reductions in depression and stress symptoms and work/school and social impairment, and medium effect size improvements in medication adherence and CD4 T-cell counts. Despite the preliminary nature of this study, results suggest that BATD-HIV may have utility as a brief treatment for HIV-infected patients with depression and warrants further investigation in larger scale randomized controlled trials.

Keywords
AIDS, anxiety, HAART, intervention, treatment outcome

Advances in HIV treatment through highly active antiretroviral therapy (HAART) have led to a steady decline in HIV-related mortality rates (World Health Organization, 2013). However, to be successful, HAART requires adherence to strict and often complicated medication regimens, and minimal or infrequent nonadherence to HAART can significantly decrease its effectiveness (Amico et al., 2007; Catz, Kelly, Bogart, Benotsch, & McAuliffe, 2000; Chesney, Morin, & Sherr, 2000). Consequently, there has been a growth of research focused on the identification of factors affecting HAART adherence, as well as the development and implementation of strategies designed to address these factors to facilitate adherence (Kelly, Otto-Salaj, Sikkema, Pinkerton, & Bloom, 1998). One factor that has received considerable attention is depression.

Depression is the second most prevalent psychiatric disorder in HIV-infected individuals, with nearly a quarter of HIV-infected individuals having major depression (Orlando et al., 2002; Rabkin, 2008). Moreover, the severity of depression has consistently shown a robust association with worse medication nonadherence (Gonzalez, Batchelder, Psaros, & Safren, 2011). As a result, a number of psychological interventions have been developed to target depression and increase medication adherence among HIV-infected individuals. These interventions vary in their approach to addressing depression and medication adherence, relying on different theoretical models (e.g., cognitive-behavioral theory, interpersonal and attachment theory, health belief model, theory of planned behavior) to address depression and facilitate
health behavior change (e.g., Balfour et al., 2006; Safren et al., 2009; Simoni, Pantalone, Plummer, & Huang, 2007; see also Olatunji, Mimiaga, Cleirigh, & Safren, 2006, for a review).

Although these interventions appear efficacious in reducing depression and medication nonadherence (Balfour et al., 2006; Olatunji et al., 2006; Safren et al., 2009; Simoni et al., 2007), most may not be feasible in clinical settings primarily serving rural populations. These interventions range in length from 4 to 20 sessions, and such a commitment may not be possible for rural populations. Indeed, rural HIV-infected individuals cite the need to travel long distances for medical care and lack of personal and public transportation as major barriers to receiving HIV-related services (Heckman et al., 1998). Consequently, there is a need to develop and evaluate brief, targeted interventions for depression and medication adherence that may be more suitable for individuals experiencing such barriers to care. One intervention that holds promise in this regard is behavioral activation.

Based on a behavioral model of depression (see Ferster, 1973; Hopko, Lejuez, Ruggiero, & Eifert, 2003), behavioral activation is designed to counter behavioral processes underlying depression by assisting patients in increasing their contact with positively reinforcing events and decreasing the negative reinforcement that occurs from avoiding aversive stimuli. Behavioral activation has considerable support in its ability to address depression across various populations (Cuijpers, van Straten, & Warmerdam, 2007; Lejuez, Hopko, Acierno, Daughters, & Pagoto, 2011). Moreover, given evidence that behavioral activation may be more time efficient and less complex than other treatments for depression, behavioral activation may be more easily implemented in a setting where there is limited opportunity to intervene (Lejuez, Hopko, & Hopko, 2001).

Therefore, this study provides an initial investigation of a one-session behavioral activation treatment for depression designed specifically for HIV-infected patients (BATD-HIV) at a community infectious disease clinic serving a largely rural population. It was expected that BATD-HIV would be associated with reductions in depression, anxiety, and stress 1 month following delivery of the intervention. It was also expected that BATD-HIV would be associated with improvements in behavioral activation and medication adherence 1 month post intervention delivery.

**Method**

**Participants**

Participants were 10 HIV-infected patients (60% male; $M_{age} = 46.50$, $SD_{age} = 5.30$; range = 38-53) in clinical care at a large public infectious disease clinic in
a university medical center located in the Southern United States. Participants self-identified as African American (80%) or White (20%). With regard to sexual orientation, 70% self-identified as heterosexual, 20% as homosexual, and 10% as bisexual. Participants were either single (70%) or married (30%). All but one participant earned at least a high school or equivalent degree, and 30% reported earning a college degree. Most participants were unemployed (60%), and all reported an annual household income of <$30,000 per year.

Measures

All measures described below were administered prior to BATD-HIV and 1 month post treatment.

The Depression Anxiety Stress Scales 21 (DASS-21; Lovibond & Lovibond, 1995) is a 21-item questionnaire that differentiates among core symptoms of depression, anxiety, and stress. The DASS-21 has adequate test–retest reliability and construct and discriminant validity (see Roemer, 2001). Higher subscale scores represent more severe symptoms (Crawford et al., 2009). Internal consistency was generally good-to-excellent across measurement occasions (α = .844-.963); however, posttreatment internal consistency for the Anxiety subscale was low (α = .471).

The Behavioral Activation for Depression Scale (BADS; Kanter, Mulick, Busch, Berlin, & Martell, 2006) assesses four domains of behavior (i.e., activation, avoidance of negative aversive events/rumination [instead of active problem solving], work/school impairment, and social impairment) that contribute to increased contact with response-contingent positive reinforcement as a result of a behavioral activation intervention (Kanter et al., 2006; Martell, Addis, & Jacobson, 2001). A total score can also be obtained, with higher scores representing greater overall engagement in adaptive behaviors. The BADS has adequate test–retest reliability and construct and discriminant validity (see Kanter et al., 2006). Total score internal consistency was good across assessments (α = .821 and .859). Internal consistency for activation and avoidance/rumination was acceptable to good (α = .735-.894), and internal consistency for work/school impairment was questionable to acceptable (α = .745 and .606). Internal consistency for social impairment was low at pretreatment (α = .344) and good at follow-up assessment (α = .848).

Participants also responded to two questions assessing HAART use. First, participants indicated the percentage (0%-100%) of antiretroviral medication taken correctly in the last month. Second, participants rated their average ability to take all antiretroviral medication in the past month as prescribed, using a 6-point Likert-type scale (0 [very poor] to 5 [excellent]). Finally, participants provided their most recent CD4 T-cell count.
BATD-HIV

BATD-HIV was based on a one-session behavioral activation intervention developed by Gawrysiak, Nicholas, and Hopko (2009), modified to be applicable to HIV-infected patients. In a single, in-person session, participants were provided with psychoeducation on (a) the symptoms of depression; (b) the role of depression in health-risk behaviors, such as medication nonadherence; and (c) the negative consequences associated with these behaviors. Afterward, the theoretical rationale underlying BATD-HIV was presented, including the utility of identifying and engaging in meaningful and positively reinforcing activities consistent with one’s values. Participants were then presented with a form describing different life domains (e.g., family relationships, physical/health, education) and asked to identify activities consistent with their values and goals in each area. An emphasis was placed on (a) identifying a variety of activities, (b) choosing activities that varied in difficulty, and (c) identifying activities that were relevant to their physical health (e.g., attending physician appointments, exercising, taking medication as prescribed). The BATD-HIV provider then assisted participants in choosing 5 to 8 activities they could accomplish and monitor on their own for Weeks 1 through 2 post treatment and set goals regarding the frequency and duration of each activity. Participants were instructed to use this same process to identify and engage in activities during Weeks 3 through 4 post treatment. Participants were provided with monitoring forms to assist with the tracking of their behavior. Finally, the BATD-HIV provider assisted participants in identifying and problem solving around potential barriers for behavioral activation. After this single session, participants no longer had contact with the BATD-HIV provider. Instead, for the next 4 weeks, participants were sent a once-weekly standardized text message reminding them to engage in previously identified activities and instructing them to identify new activities (e.g., “Each day, do something in-line with your values. Think about who you want to be and the life you want to live. Commit to take action.”). Each weekly text message was different and was delivered at the same time each week.

Procedure

HIV-infected patients were recruited when visiting the clinic for regular medical appointments and when research personnel were available. Upon intake, patients were asked to complete the Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001), a nine-item self-report measure commonly used to screen for symptoms of depression. Patients reporting $\geq 4$ symptoms at a severe level (i.e., more than half the days in the previous 2
Behavior Modification 00(0)

weeks) were asked by the intake coordinator whether they were interested in learning about a study on depression. Interested patients’ name and PHQ-9 score were provided to research personnel. A count of patients who declined to learn about the study was not kept.

Following their scheduled clinic appointment, interested patients were provided with more information about the study. After informed consent was obtained, participants completed a questionnaire packet including the measures described above. Next, the 1-hr BATD-HIV was delivered. No compensation was provided for completion of the initial questionnaires or intervention. Participants were contacted by phone approximately 1 month later to deliver the follow-up questionnaires. Upon completion of the follow-up assessment, participants were mailed a US$15 gift card.

Analysis Plan

Pretreatment to follow-up assessment changes in medication adherence, DASS-21 scores, and BADS scores were examined via dependent t tests, conducted using SPSS Statistics 22.0.0.2 for Mac and evaluated as directional (one-tail) tests with α = .05. Given limitations of these procedures to detect significant results in small samples, effect sizes (Cohen’s d, calculated using formulas for repeated measures; Dunlap, Cortina, Vaslow, & Burke, 1996) were interpreted for all appropriate analyses.

Reliable and clinically significant change (Evans, Margison, & Barkham, 1998; Jacobson & Truax, 1991) on the DASS-21 and BADS was also examined using Microsoft Excel for Mac 2011, version 14.5.5. Reliable change refers to the change in score needed to surpass what may be expected due to variability in the measures. Clinically significant change is a measure of an individual’s probability of moving from a clinical population to a normative population following treatment (i.e., Criterion C; Jacobson & Truax, 1991) and was computed for those who evidenced reliable change only. In addition, clinically significant change was examined by comparing the present distributions of scores with those of a community sample for the DASS-21 (Crawford et al., 2009) and an undergraduate sample for the BADS (Kanter et al., 2006, Study 2).

Results

One participant did not respond to one pretreatment BADS item, and one participant did not respond to two pretreatment BADS items. These missing scores were replaced with within-participant subscale item mean scores. Inspection of histograms, Q–Q plots, and skewness and kurtosis statistics indicated that all continuous variables approximated normal distributions.
Medication Adherence

Most participants reported an excellent ability to take medication as prescribed at pretreatment ($M = 4.44, SD = 1.13$); thus, the increase in adherence at follow-up was small and nonsignificant, $M = 4.78, SD = 0.67, t(8) = 1.00, p = .174, d = .34$. Participants reported taking their medication 85.56% ($SD = 29.63$) of the time in the month prior to BATD-HIV. Although a medium-sized increase in medication taken during the month following BATD-HIV was detected ($M = 96.67, SD = 10.00$), the difference from pre- to follow-up BATD-HIV was not significant, $t(8) = 1.089, p = .154, d = .62$. Likewise, despite a medium-sized increase in CD4 T-cell counts from pre- ($M = 334.83, SD = 96.20$) to follow-up assessment ($M = 421.57, SD = 126.27$), this difference was not significant, $t(5) = 0.99, p = .169, d = .62$.

Depression, Anxiety, and Stress Symptoms

Table 1 provides descriptive and inferential statistics and effect sizes. DASS-21 depression scale scores indicated that participants were initially experiencing severe symptoms of depression ($\geq 21$) and extremely severe anxiety symptoms ($\geq 20$; see Roemer, 2001), as well as moderate levels of stress ($\geq 19$) prior to BATD-HIV delivery. By follow-up, participants reported medium-sized but nonsignificant reductions in depression and stress and a large and significant reduction in anxiety.

Reliable and clinically significant change is presented in Table 2. Two participants (20%) entered the study below the clinically significant cutoff on all symptom scales and thus could not show clinically significant improvements. In addition, three participants were below the cutoff for anxiety, and three participants were below the cutoff for stress. Regardless, 40% ($n = 4$) of participants evidenced clinically significant improvement in depression symptoms, 20% ($n = 2$) reported clinically significant improvement in anxiety, and 30% ($n = 3$) showed clinically significant improvement in stress symptoms. One participant (10%) showed clinically significant worsening of stress symptoms. Overall, 30% ($n = 3$) of the sample did not demonstrate significant change on any symptom scale, whereas 40% ($n = 4$) demonstrated significant improvements on at least two symptom scales.

Change in Behavioral Activation Domains

On average, the sample reported a large and significant increase in total behavioral activation from pretreatment to follow-up assessment (see Table 1). Yet, activation per se did not account for a large portion of this total change; a
nonsignificant and small increase in activation was detected from pretreatment to the follow-up assessment. In contrast, participants reported a large and significant decrease in avoidance/rumination from pretreatment to the follow-up assessment. Finally, participants reported medium-sized reductions in both work/school and social impairment; however, these reductions were not statistically significant.

Reliable change and clinically significant change results are presented in the lower half of Table 2. One participant (10%) entered the study above the clinically significant change cutoff for total behavioral activation and demonstrated clinically significant worsening. However, 50% \((n = 5)\) of the sample showed clinically significant improvement in total behavioral activation. Two participants (20%) entered the study above the clinically significant cutoff for the Activation subscale. One participant (10%) showed clinically significant worsening, and 20% \((n = 2)\) of the sample demonstrated clinically significant increases in activation. For avoidance/rumination, one participant (10%) entered the study below the clinically significant cutoff, yet 30% \((n = 3)\) of the sample demonstrated clinically significant reductions in avoidance. For work/school impairment, four participants (40%) entered the study below the cutoff, and 20% \((n = 2)\) of the sample demonstrated clinically significant

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre M (SD)</th>
<th>Follow-up M (SD)</th>
<th>t(9)</th>
<th>p</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological symptom outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Depression</td>
<td>12.20 (5.92)</td>
<td>8.30 (8.59)</td>
<td>−1.424</td>
<td>.094</td>
<td>−0.520</td>
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<tr>
<td>Anxiety</td>
<td>10.20 (6.20)</td>
<td>6.10 (3.54)</td>
<td>−1.947</td>
<td>.042</td>
<td>−0.802</td>
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<tr>
<td>Stress</td>
<td>12.10 (5.09)</td>
<td>9.00 (6.94)</td>
<td>−1.322</td>
<td>.110</td>
<td>−0.505</td>
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<tr>
<td>Behavioral activation domains</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Total score</td>
<td>62.04 (20.57)</td>
<td>90.2 (25.84)</td>
<td>2.408</td>
<td>.020</td>
<td>1.209</td>
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<tr>
<td>Activation</td>
<td>14.78 (10.81)</td>
<td>17.60 (9.47)</td>
<td>0.591</td>
<td>.285</td>
<td>0.277</td>
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<tr>
<td>Avoidance/</td>
<td>28.84 (10.19)</td>
<td>17.60 (13.22)</td>
<td>−1.978</td>
<td>.040</td>
<td>−0.955</td>
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<td>rumination</td>
<td></td>
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<td></td>
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<tr>
<td>Work/school impairment</td>
<td>13.50 (8.13)</td>
<td>9.30 (6.29)</td>
<td>−1.281</td>
<td>.116</td>
<td>−0.578</td>
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<tr>
<td>Social impairment</td>
<td>18.40 (5.23)</td>
<td>12.40 (9.74)</td>
<td>−1.750</td>
<td>.057</td>
<td>−0.764</td>
</tr>
</tbody>
</table>

Note. Depression, anxiety, and stress assessed by the Depression Anxiety Stress Scales 21. Behavioral activation total and subscale scores assessed with the Behavioral Activation for Depression Scale. Tests of significance were conducted as one-tailed tests.
reductions in work/school impairment. Finally, for social impairment, no participants entered below the cutoff, and 30% ($n = 3$) showed clinically significant reductions in social impairment. In sum, 70% ($n = 7$) of participants reported clinically significant gains in at least one domain of behavioral activation, and 50% ($n = 5$) reported clinically significant gains in at least two domains. Of note, only one participant (10%) exhibited a clinically significant worsening across behavioral activation domains.

**Discussion**

The purpose of this study was to conduct an initial, uncontrolled open-trial evaluation of BATD-HIV within a sample of HIV-infected patients. Overall, results provide preliminary evidence that BATD-HIV merits further investigation as a brief treatment for HIV-infected patients with depression. Specifically, after receiving BATD-HIV, participants exhibited significant reductions in anxiety symptom severity and avoidance and rumination. Although nonsignificant in our small sample, participants also showed (a)

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<th>Table 2. Reliable Change and Clinically Significant Change Criteria for Psychological Symptoms and Behavioral Activation Domains.</th>
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<td><strong>Variable</strong></td>
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<td>Avoidance/ rumination</td>
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<td>Work/school impairment</td>
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<td>Social impairment</td>
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</table>

*Note.* Depression, anxiety, and stress assessed by the Depression Anxiety Stress Scales 21. Behavioral activation total and subscale scores assessed with the Behavioral Activation for Depression Scale.
medium effect size reductions in depression and stress symptoms and work/school and social impairment, and (b) medium effect size improvements in medication adherence and CD4 T-cell counts. Moreover, 40% \((n = 4)\) of participants evidenced clinically significant change in depression symptoms and 70% \((n = 7)\) of participants exhibited clinically significant change on at least one behavioral activation domain.

It warrants mention that participants reported greater reductions in anxiety than depression symptoms, with the former exhibiting a statistically significant reduction from pre- to 1 month posttreatment. Participants reported higher anxiety versus depression symptom severity at baseline, perhaps accounting for this finding. However, given evidence that participants exhibited significant reductions in avoidance behavior, a core mechanism underlying the maintenance of anxiety symptoms (Dymond & Roche, 2009; Mowrer, 1960), results may also demonstrate that BATD-HIV is particularly suited to addressing symptoms of anxiety. Indeed, previous studies have shown that brief behavioral activation treatments for depression can be efficacious in reducing symptoms of anxiety (e.g., Hopko et al., 2011).

Participants also reported a modest increase in medication adherence. Findings for medication adherence were likely not stronger due to most participants reporting a high level of medication adherence pretreatment. Future studies would benefit from recruiting HIV-infected patients with depression who also endorse difficulties adhering to medication regimens. Such studies would be better positioned to determine whether BATD-HIV may contribute to improvements in medication adherence through reductions in the severity of depression.

Despite evidence for the potential utility of BATD-HIV in reducing psychological distress and improving medication adherence, findings must be considered in light of study limitations. First and foremost, our study was an uncontrolled, open trial of BATD-HIV in a small sample of HIV-infected patients. Consequently, in addition to the likelihood of Type II error, it is possible that any observed changes in outcome measures may have simply been due to the passage of time and not BATD-HIV. Therefore, prior to making definitive claims regarding the efficacy of BATD-HIV, future studies must be conducted that (a) involve larger samples of HIV-infected patients, (b) compare BATD-HIV with treatment-as-usual or other existing psychological interventions for depression and medication adherence, and (c) include a longer term follow-up period. Moreover, one participant exhibited a worsening of behavioral activation processes from pre- to 1 month posttreatment, suggesting that BATD-HIV may not be suitable for all HIV-infected individuals. Given our small sample size, it is not possible to determine why this participant did not respond to BATD-HIV. Future studies investigating BATD-HIV
in larger samples and collecting additional data (e.g., presence of psychiatric disorders, such as substance use disorders, posttraumatic stress disorder, or borderline personality disorder) could explore moderating variables that predict nonresponder status. In addition, given that participants were only those who expressed interest in the study, it is possible that participants in this study were highly motivated to address their symptoms of depression or health behaviors. It will be necessary to evaluate how BATD-HIV performs among patients with low levels of motivation and other symptoms that could interfere with treatment efficacy, such as ambivalence, helplessness, hopelessness, and anhedonia. Moreover, some of our outcomes were associated with low internal consistency (e.g., follow-up anxiety symptom severity, preintervention social impairment), and findings involving these outcomes should therefore be interpreted with caution. Future studies should utilize diagnostic interviews to evaluate symptom change and impairment. Finally, single-item self-report measures of medication adherence were used in this study. Although such measures are valid (Simoni et al., 2006), future studies would benefit from the use of more objective measures of medication adherence, such as pill counts, pharmacy refill data, and knowledge of medication names and regimens (Simoni et al., 2006).

Although preliminary, findings provide initial support for the further evaluation of BATD-HIV. With additional research, BATD-HIV may be found to be an intervention that offers a time-efficient and targeted method of reducing depression, anxiety, and stress symptoms, medication nonadherence, and avoidance behavior among HIV-infected patients who would not otherwise have easy access to psychological care.

**Declaration of Conflicting Interests**
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Christopher R. Berghoff is a clinical psychologist who specializes in the treatment of anxiety and mood disorders, as well as the intersection of psychological and physical health difficulties. His research focuses on developing behavioral health interventions and translating efficacious behavioral treatments into cost-effective and rapidly deliverable formats.

Joseph R. Bardeen is an assistant professor in the Department of Psychology at Auburn University. His research is broadly focused on information processing and emotion regulation in the development and maintenance of posttraumatic stress and anxiety disorders.

Michelle Schoenleber is an assistant professor of psychology at St. Norbert College in De Pere, Wisconsin. Her work primarily focuses on self-conscious emotions (e.g., shame) in the onset and maintenance of mental illness, as well as on the development and refinement of targeted interventions for shame.

Deborah J. Konkle-Parker has a history of conducting HIV research in the Southern United States, including three National Institutes of Health (NIH)–funded studies, in addition to providing clinical HIV care. Her research training is in behavioral research, especially testing interventions to improve medication adherence and retention in HIV care.