

Cognitive–affective depressive symptoms and substance use among Latino and non-Latino White patients in HIV care: an analysis of the CFAR network of integrated clinical systems cohort

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Abstract The disparity in viral suppression rates between Latino and non-Latino White patients in HIV care appears to be narrowing, but it is unclear if depression and substance use perpetuate this disparity. We analyzed electronic medical records from the CFAR network of integrated clinical systems cohort. First observations/enrollment data collected between 2007 and 2013 were analyzed, which included survey (race/ethnicity, depression, substance use, adherence) and clinical data (viral suppression). We estimated indirect effects with a regression-based bootstrapping method. In 3129 observations, Latinos and non-Latino Whites did not differ in depression or alcohol use (ORs 1.11, 0.99, *ns*), but did in drug use (OR 1.13, $p < .001$). For all patients, depression and substance use were indirectly associated with small increases (ORs 1.02–1.66) in the odds for a detectable viral load, via worse adherence. We conclude that variables not captured in EMR systems (e.g., health literacy, structural factors) may better explain viral suppression disparities that persist.

Keywords HIV/AIDS · Latino/hispanic · Mental health · Substance use · Viral suppression

Introduction

In the U.S., viral suppression rates have steadily improved from 2000 to the present (Althoff et al., 2012; CDC, 2017). However, viral suppression rates have historically always been lower among HIV + Latinos when compared to HIV + non-Latino Whites; even after narrowing in recent years. For example, in 2014, less than half (48.1%) of Latinos achieved durable viral suppression (i.e., three previous viral load tests were all undetectable), compared to 56.4% of non-Latino Whites (Crepaz et al., 2017).

Two predictors of viral non-suppression are mental health and substance use problems, which remain highly prevalent among people living with HIV (PLWH). Approximately 33% of all PLWH report a depressive disorder, > 25% report use of illicit drugs, and > 12–33% report problematic drinking (Bing et al., 2001; Hessol et al., 2007).

Depression and substance use affect adherence by disrupting motivation, problem-solving ability, memory, or through toxicity beliefs (i.e., cannot mix substance use with ART), which then lead to higher viral load and a faster mortality (Baum, et al., 2009; Baum et al., 2010; Ironson et al., 2017; Leserman, 2008; Gonzalez et al., 2011). What needs further clarification is whether disparities in viral suppression among Latinos can be explained through greater depressive symptoms or substance use. This is especially concerning given evidence that mild depressive symptoms may differentially impact adherence for Latinos compared to non-Latino Whites (Saucedo et al., 2016).

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In depression-adherence research, it is also required to use precise analyses of depression data. In most HIV-related studies, somatic depressive symptoms (i.e., fatigue, sleep or appetite problems) collected through self-report rating scales are not disentangled from HIV symptoms, side effects, pain-related conditions, or other comorbidities (Saberi et al., 2013; Kalichman et al., 2000; Merlin et al., 2012). Most estimates of the depression-adherence relationship, including those in three separate meta-analyses, do not specifically state if somatic symptoms have been differentiated from cognitive–affective symptoms (Gonzalez et al., 2011; Langebeek et al., 2014; Uthman et al., 2014). Global measures of depression can indicate general psychological distress, but more precise approaches would only include non-somatic (cognitive–affective) symptoms (Wagner et al., 2011) when rigorous clinical assessments of depression are not feasible (such as in large cohort studies).

In this brief report, we investigated non-somatic depression, substance use, and HIV treatment outcomes data from Latino and non-Latino White patients in the CNICS Cohort study (Center for AIDS Research Network of Integrated Clinical Systems). The CNICS cohort comprises of a nationwide network of university-affiliated HIV care clinics (Kitahata et al., 2008). We analyzed clinical and self-report data from patients at entry into the cohort with the objective to test if Latinos, compared to non-Latino Whites, reported greater non-somatic (cognitive–affective) depression and substance use scores, and if these scores were associated with viral suppression via medication non-adherence (Fig. 1).

Method

Sample and procedure

CNICS electronic medical records (EMRs) comprise centralized patient survey and clinic data from seven academic-affiliated HIV clinics across the West and East Coasts, Midwest and Southern U.S. (Kitahata et al., 2008). Survey data are patient responses to standardized measures that are integrated into EMRs with clinical data (e.g., viral load; VL). Data are collected at HIV care appointments on tablets/computers. We used a cross-sectional design and analyzed the first patient observations in the cohort that occurred anytime between 2007 and 2013 as a snapshot of whether Latinos (vs. non-Latino Whites) reported greater depression and substance use.

Recruitment

Patients enter CNICS at an HIV appointment through a standard informed consent process (Details in Kitahata et al., 2008). Inclusion criteria are: (1) be HIV + and at least 18 years old, (2) speak English or Spanish, and (3) had at least two appointments within 12 months at a CNICS site.

Measures

Depression and substance use are measured with the Patient Health Questionnaire, the Alcohol, Smoking and Substance Involvement Screening Test, and the abbrevi-

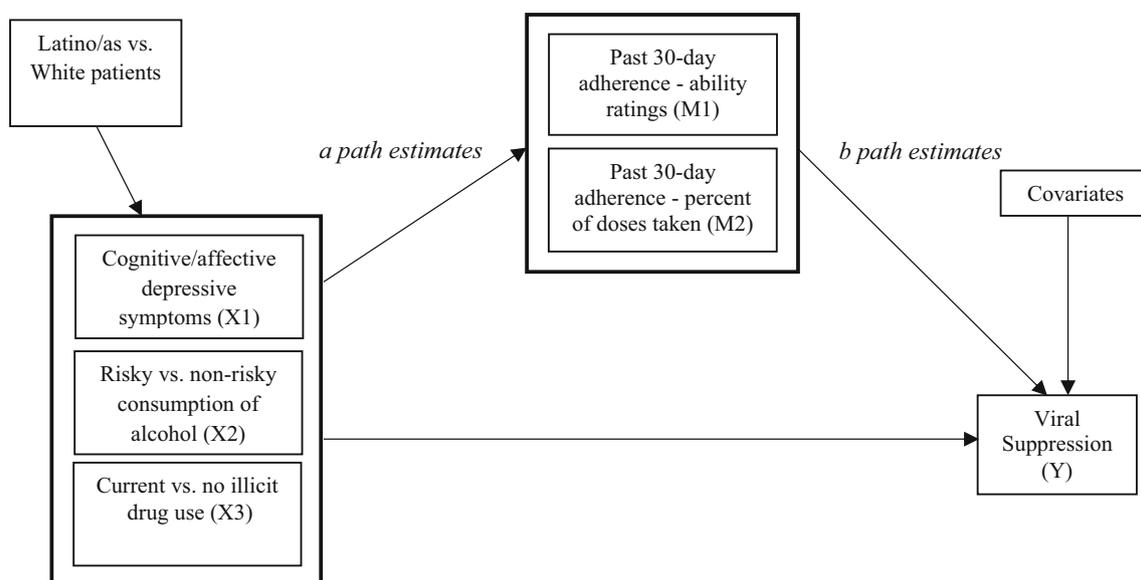


Fig. 1 Visual of two adherence measures as indirect effects for the relationship between depression, alcohol use, and drug use, and outcome of viral suppression. Indirect effects are ORs calculated as $a * b$ path estimates bootstrapped in 20,000 re-samples

ated Alcohol Use Disorders Identification Test (Kroenke et al., 2001; Saunders et al., 1993; WHO, 2002). Substance use EMR scores follow published cutoff scores (Cohort survey details are published elsewhere; Kitahata et al., 2008). We removed somatic symptom items from the PHQ-9 as they may confound disease/side-effect symptoms (e.g., feeling tired; Kalichman et al., 2000). This resulted in five items corresponding to cognitive or affective symptoms. The internal consistency estimate was equal to .80., with all items rated on a 4-point scale from 0 (not at all) to 3 (nearly every day). Past 3-month illicit drug use scores (cocaine, opiates, amphetamines) are coded in the EMR as 1 (*current use*) or 0 (*never or past use*), and at-risk alcohol use scores are coded in the EMR as 1 (*risky*) or 0 (*non-risky drinking*).

Adherence and viral load

Past 30-day ART adherence was assessed with two validated single-item measures (Kitahata et al., 2008; Simoni et al., 2006). Adherence ability (“how was your ability to take [ART]”) is scored from 1 (*very poor*) to 6 (*excellent*), while percent adherence is scored from 0 to 100% continuously (Lu et al., 2008). A priori, we converted VAS scores as continuous percentages into an ordinal scale in order to use the full set of information. We distributed VAS scores across seven levels (0 = 0–40%, 1 = 41–50%, 2 = 51–60%, 3 = 61–70%, 4 = 71–80%, 5 = 81–90%, 6 = 91–100%) because the VAS data were heavily skewed and concentrated in three areas (i.e., < 40%, > 81–90%, and > 90%). VL thresholds varied by site, but in this study, > 400 copies/ml were coded as 1 (*detectable/not suppressed*); otherwise, VL was coded as 0 (*undetectable/suppressed*). Covariates available from EMRs were: (1) race/ethnicity (1 = *Latino*, 0 = *non-Latino White*), (2) sex at birth (1 = *male*, 0 = *female*) and (3) age.

Analysis

Using *Mplus*, we tested for indirect effects with 20,000 bootstrap samples with full information maximum likelihood to incorporate cases with incomplete data. Figure 1 is a visualization of the test for differences between Latinos and non-Latino Whites on the depression (X1), drug use (X2), and alcohol use (X3) variables. The indirect effects for X1–X3 variables on viral suppression (Y) were modeled through the two adherence variables (M1, M2). Theta parametrization was used to estimate the VAS (M1) as an ordinal variable. Beta weights were converted to odds ratios for non-continuous variables, and confidence intervals are shown for indirect effects (X1–X3 on Y via M1–M2); if the 95% confidence interval excludes zero, the effect is statistically significant at $p < .05$.

Results

Sample

There were 3129 patient observations available (21.4% Latino, 78.6% non-Latino White; 5.8% female). Approximately 63.9% of Latinos were virally suppressed, 26% reported at-risk alcohol use, and 34.2% were current drug users. Average cognitive–affective scores were 3.24 (SD= 3.63). For non-Latino Whites, 64.6% were virally suppressed, 27.2% reported at-risk alcohol use, and 26.6% were current drug users. Depression scores were similar to Latino scores (cognitive–affective score mean = 3.27, SD= 3.8).

On the 6-point adherence ability scale, 21.3% of Latinos reported very good adherence ability (score of 5), compared to 21.5% of non-Latino Whites, whereas 56.8% of Latinos reported excellent adherence ability (score of 6), compared to 66.3% of non-Latino Whites. On the VAS, 33.5% of Latinos reported less than 40% adherence, compared to 27.7% of non-Latino Whites. On the other end of the scale, 55.24% of Latinos reported > 91% adherence, compared to 63.5% of non-Latino Whites.

Race/ethnicity and direct effects

In 3129 observations, odds for greater cognitive–affective depression or at-risk alcohol use were not different between Latino and non-Latino White patients (ORs 1.11, 0.99, $ps = .54, .65$, respectively). Latinos had higher odds for current drug use (OR 1.13, $p < .001$). Cognitive–affective depression, drug use, and alcohol use (X1–X3) were negatively associated with lower percent adherence ($bs = -1.91, -.09, -.18$, $ps < .05$), but only depression and drug use (X1, X2) were associated with adherence ability ($bs = -1.12, -.07$, $ps < .001$). There were no direct effects of depression or substance use on viral suppression.

A 1-unit increase in the percent adherence categories (M2) was associated with a 24% decrease in the odds for a detectable VL (OR .76, $p < .001$). Age was negatively associated with VL (OR .97, $p < .001$), but not being female.

Indirect effects

Cognitive–affective depression (X1) was associated with a small (2%) increase in the odds for a detectable VL (Y) through worse ART percent adherence (M2) (Indirect OR 1.02, 95% CI 1.01–1.03). At-risk alcohol use (X3) was also associated with a 5% increase in the odds for a detectable VL (Y) through worse ART percent adherence (M2) (Indirect OR 1.05; 95% CI 1.02–1.08). Current drug

use (X2) was associated with a 66% increase in the odds for a detectable VL (Y) through worse percent adherence (M2) (Indirect OR 1.66, 95% CI 1.41–1.96). ART adherence ability (M1) did not demonstrate any indirect effect.

Discussion

Aggregated nationwide HIV care cohort data did not reveal that Latinos reported greater cognitive–affective depression or at-risk alcohol use, when compared to non-Latino Whites. Latino patients were more likely to report current use of cocaine, opiates, or amphetamines, but the observed prevalence (26.6%) was within the range found in other multisite studies of drug use among PLWH or at-risk for HIV (Bing et al., 2001; Hessol et al., 2007; Zaller et al., 2017). In summary, problems of depression and alcohol use are found in similar percentages of Latinos and non-Latino Whites, but illicit drug use may be higher for Latinos in this clinic setting.

With a total of 3129 patient observations, cognitive–affective depressive symptoms, at-risk alcohol and current illicit drug use were negatively associated with viral suppression through adherence for all patients. While these relationships are not surprising, the indirect effect of depressive symptoms is more precise given the specificity associated with endorsing cognitive–affective symptoms only; an effect reported in previous studies using these symptom scores (Wagner et al., 2011; Saucedo et al., 2016).

However, somatic depressive symptoms have shown to be predictive of non-adherence and poorer health outcomes in other chronic diseases (de Jonge et al., 2006; Gonzalez et al., 2016). But in these cases, inferences for differential effects of somatic versus cognitive–affective symptoms were based on the strength of rigorous clinical assessments or in the well-controlled context of a clinical trial. In studies where it is not feasible to conduct repeated clinical assessments (e.g., cohort designs), we suggest optimizing the specificity (true positive rate) of self-report depression scales by only including cognitive–affective items, given that somatic items (e.g., feeling tired, appetite problems) are difficult to differentiate from other physical disease states.

Overall, we conclude that viral suppression outcomes among Latinos may be better explained by information not captured in traditional EMR systems (e.g., health literacy, competing needs, lack of adequate health insurance, and language barriers; Gonzalez et al., 2009). As noted in one review, the diversity of Latinos and their risk factors for sub-optimal HIV outcomes are understudied and not routinely captured in clinical systems (e.g., place of birth, reason for migration, cross-border travel, documentation

status; Sheehan et al., 2015; Saucedo et al., 2018). Thus, clinical systems may be limited in the ability to understand the socio-cultural factors that explain HIV outcomes. For example, we speculate that Latinos in CNICS may be more acculturated than Latinos not retained in HIV care, or Latinos who do not live in major metropolitan areas where research clinics such as CNICS are located.

Implications

Problems of mental health and substance use have been and continue to be associated with worse HIV treatment outcomes and faster mortality (Ironson et al., 2017; Page-Shafer et al. 1996; Saucedo et al., 2017). With this knowledge and the “Treatment as Prevention Strategy”—national goal to retain PLWH in HIV care and ensure viral suppression— it is clear that new thinking is needed to address the mental health challenges that persist (Nachega et al., 2014).

In settings like CNICS clinics, with resources and an EMR network infrastructure, one solution is to implement and monitor the benefits of brief and highly-efficacious treatment interventions for problems of adherence, depression, and substance use (Altice et al., 2010; Chaichati et al., 2014; Safren et al., 2016). These interventions have been tailored for many different groups of PLWH, such as injection drug using PLWH and Latinos (Safren et al., 2012; Simoni et al., 2013), and are the major contributions of social and behavioral scientists working in the HIV field. Given that we have the tools to address mental health and substance use problems, dissemination and implementation science research may be one promising mechanism to understand why these interventions have yet to be fully adopted, and how we can prepare them for implementation in settings such as CNICS.

Limitations

The self-report data and cross-sectional design are indeed limited when testing indirect effects. To overcome this, we aggregated and classified all data as first observations to maximize the sample size available for analysis, but survey administrations and VL draws also did not always occur on the same appointment date. Thus, we emphasize findings as global associations of aggregated data (i.e., snapshot of effects). Participants were also regularly seen in HIV care and different from persons completely out of care. Lastly, each site is an NIH-sponsored CFAR, but their site characteristics could not be controlled for or differentiated with EMR data (e.g., could not confirm from all sites which surveys were completed in Spanish).

Conclusion

In conclusion, Latinos and non-Latino White patients in HIV care commonly report problems of mental health and substance use, yet there is a substantial literature on treatment interventions to address these problems. Providing greater access to treatment interventions through HIV care settings and large research networks may be a new way to optimize the “Treatment as Prevention” strategy moving forward.

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Compliance with ethical standards

Conflict of interest John A. Saucedo, Nadra E. Lisha, Torsten B. Neilands, Katerina A. Christopoulos, W. Christopher Mathews, Julie H. Levison, Ann M. Dennis and Mallory O. Johnson declare that they have no conflict of interest.

Ethical approval The University of California, San Francisco’s Institutional Review Board approved this study.

Human and animal rights and Informed consent All procedures followed were in accordance with ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all individual participants included in the study.

References

- Althoff, K. N., Buchacz, K., Hall, I., Zhang, J., Hanna, D. B., Rebeiro, P., et al. (2012). U.S. trends in antiretroviral therapy use, HIV RNA plasma viral loads, and CD4 T-lymphocyte cell counts among HIV-infected persons, 2000–2008. *Annals of Internal Medicine*, *157*, 325–335. <https://doi.org/10.7326/0003-4819-157-5-201209040-00005>
- Altice, F. L., Kamarulzaman, A., Soriano, V. V., Schechter, M., & Friedland, G. H. (2010). Treatment of medical, psychiatric, and substance-use comorbidities in people infected with HIV who use drugs. *Lancet*, *376*, 367–387. [https://doi.org/10.1016/s0140-6736\(10\)60829-X](https://doi.org/10.1016/s0140-6736(10)60829-X)
- Baum, M. K., Rafie, C., Lai, S., Sales, S., Page, J. B., & Campa, A. (2009). Crack-cocaine use accelerates HIV disease progression in a cohort of HIV-positive drug users. *Journal of Acquired Immune Deficiency Syndromes*, *50*, 93–99. <https://doi.org/10.1097/QAI.0b013e3181900129>
- Baum, M. K., Rafie, C., Lai, S., Sales, S., Page, J. B., & Campa, A. (2010). Alcohol use accelerates HIV disease progression. *AIDS Research and Human Retroviruses*, *26*, 511–518. <https://doi.org/10.1089/aid.2009.0211>
- Bing, E. G., Burnam, M. A., Longshore, D., Fleishman, J. A., Sherbourne, C. D., London, A. S., et al. (2001). Psychiatric disorders and drug use among human immunodeficiency virus-infected adults in the United States. *Archives of General Psychiatry*, *58*, 721–728. <https://doi.org/10.1001/archpsyc.58.8.721>
- Centers for Disease Control. (2017). More people with HIV have the virus under control [news release]. CDC NCHHSTP Newsroom: Atlanta, GA; July 27, 2017. <https://www.cdc.gov/nchhstp/newsroom/2017/2017-HIV-Continuum-Press-Release.html>. Accessed December 23, 2017.
- Chaiyachati, K. H., Ogbuonji, O., Price, M., Suthar, A. B., Negussie, E. K., & Barnighausen, T. (2014). Interventions to improve adherence to antiretroviral therapy: A rapid systematic review. *AIDS*, *28*, S187–S204. <https://doi.org/10.1097/QAD.0000000000000252>
- Crepaz, N., Tang, T., Marks, G., & Hall, I. (2017). Viral suppression patterns among persons in the United States with diagnosed HIV infection in 2014. *Annals of Internal Medicine*, *167*, 446–447. <https://doi.org/10.7326/L17-0278>
- de Jonge, P., Ormel, J., van den Brink, R. H., van Melle, J. P., Spijkerman, T. A., Kuijper, A., et al. (2006). Symptom dimensions of depression following myocardial infarction and their relationship with somatic health status and cardiovascular prognosis. *American Journal of Psychiatry*, *163*, 138–144. <https://doi.org/10.1176/appi.ajp.163.1.138>
- Gonzalez, J. S., Batchelder, A. W., Psaros, C., & Safren, S. A. (2011). Depression and HIV/AIDS treatment non-adherence. A review and meta-analysis. *Journal of Immune Deficiency Syndromes*, *58*, 181–187. <https://doi.org/10.1097/QAI.0b013e31822D490A>
- Gonzalez, J. S., Hendriksen, E. S., Collins, E. M., Durán, R. E., & Safren, S. A. (2009). Latinos and HIV/AIDS: Examining factors related to disparity and identifying opportunities for psychosocial intervention research. *AIDS and Behavior*, *13*, 582–602. <https://doi.org/10.1007/s10461-008-9402-4>
- Gonzalez, J. S., Kane, N. S., Binko, D. H., Shapira, A., & Hoogendoorn, C. J. (2016). Tangled up in Blue: Unraveling the links between emotional distress and treatment adherence in Type 2 diabetes. *Diabetes Care*. <https://doi.org/10.2337/dc16-1657>
- Hessol, N. A., Kalinowski, A., Benning, L., Mullen, J., Young, M., Palella, F., et al. (2007). Mortality among participants in the Multicenter AIDS Cohort Study and the Women’s Interagency HIV Study. *Clinical Infectious Diseases*, *44*, 287–294. <https://doi.org/10.1086/510488>
- Ironson, G., Fitch, C., & Stuetzle, R. (2017). Depression and survival in a 17-year longitudinal study of people with HIV: Moderating effects of race and education. *Psychosomatic Medicine*, *79*, 749–756. <https://doi.org/10.1097/PSY.0000000000000488>
- Kalichman, S. C., Rompa, D., & Cage, M. (2000). Distinguishing between overlapping somatic symptoms of depression and HIV disease progression in people living with HIV-AIDS. *Journal of Nervous and Mental Disease*, *188*, 662–670.
- Kitahata, M. M., Rodriguez, B., Haubrich, R., Boswell, S., Mathews, W. C., Lederman, M. M., et al. (2008). Cohort profile: The centers for AIDS research network of integrated clinical systems. *International Journal of Epidemiology*, *37*, 948–955. <https://doi.org/10.1093/ije/dym231>
- Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9. *Journal of General Internal Medicine*, *16*, 606–613. <https://doi.org/10.1046/j.1525-1497.2001.016009606.x>
- Langebeek, N., Gisolf, E. H., Reiss, P., Vervoort, S. C., Hafsteinsdottir, T. B., Richier, C., et al. (2014). Predictors and correlates of adherence to combination antiretroviral therapy (ART) for chronic HIV infection: A meta-analysis. *BMC Medicine*, *12*, 142. <https://doi.org/10.1186/s12916-014-0142-1>
- Leserman, J. (2008). Role of depression, stress, and trauma in HIV disease progression. *Psychosomatic Medicine*, *70*, 539–545. <https://doi.org/10.1097/PSY.0b013e3181777a5f>
- Lu, M., Safren, S. A., Skolnik, P. R., Rogers, W. H., Coady, W., Hardy, H., et al. (2008). Optimal recall period and response task

- for self-reported HIV medication adherence. *AIDS and Behavior*, 12, 86–94. <https://doi.org/10.1007/s10461-007-9261-4>
- Merlin, J. S., Cen, L., Praestgaard, A., Turner, M., Obando, A., Alpert, C., et al. (2012). Pain and physical and psychological symptoms in ambulatory HIV patients in the current treatment era. *Journal of Pain and Symptom Management*, 43, 638–645. <https://doi.org/10.1016/j.jpainsymman.2011.04.019>
- Nachega, J. B., Uthman, O. A., del Rio, C., Mugavero, M. J., Rees, H., & Mills, E. J. (2014). Addressing the Achilles' heel in the HIV Care Continuum for Success of a test-and-treat strategy to achieve an AIDS-Free Generation. *Clinical Infectious Diseases*, 59, S21–S27. <https://doi.org/10.1093/cid/ciu299>
- Page-Shafer, K., Delorenze, G. N., Satariano, W. A., & Winkelstein, W. (1996). Comorbidity and survival in HIV-infected men in the San Francisco Men's Health Study. *Annals of Epidemiology*, 6, 420–430. [https://doi.org/10.1016/S1047-2797\(96\)00064-6](https://doi.org/10.1016/S1047-2797(96)00064-6)
- Saberi, P., Comfort, M., Sheon, N., & Johnson, M. O. (2013). Qualitative study of the quality of sleep in marginalized individual living with HIV. *Patient Preference and Adherence*, 7, 499–507. <https://doi.org/10.2147/ppa.s44595>
- Safren, S. A., Bedoya, C. A., O'Cleirigh, C., Biello, K. B., Pinkston, M. M., Stein, M. D., et al. (2016). Cognitive-behavioural therapy for adherence and depression in patients with HIV: A three-arm randomised controlled trial. *Lancet HIV*, 3, e529–e538. [https://doi.org/10.1016/s2352-3018\(16\)30053-4](https://doi.org/10.1016/s2352-3018(16)30053-4)
- Safren, S. A., O'Cleirigh, C. M., Bullis, J. R., Otto, M. W., Stein, M. D., & Pollack, M. H. (2012). Cognitive-behavioral therapy for adherence and depression (CBT-AD) in HIV-infection injection drug users: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*, 80, 404–415. <https://doi.org/10.1037/a0028208>
- Sauceda, J. A., Brooks, R. A., Xavier, J., Maiorana, A., Georgetti Gomez, L., Zamudio-Haas, S., Rodriguez-Diaz, C. E., et al. (2018). From theory to application: A description of transnationalism in culturally-appropriate HIV interventions of outreach, access, and retention among Latino/a populations. *Journal of Immigrant and Minority Health*. <https://doi.org/10.1007/s10903-018-0753-2>
- Sauceda, J. A., Johnson, M. O., & Saberi, P. (2016). Nonadherence as 4-day antiretroviral therapy interruptions: Do depression and race/ethnicity matter as much in the modern antiretroviral therapy era? *AIDS and Behavior*, 20, 2624–2628. <https://doi.org/10.1007/s10461-015-1283-8>
- Sauceda, J. A., Neilands, T. B., Johnson, M. O., & Saberi, P. (2017). An updated on the barriers to adherence and a definition of self-report non-adherence given advancements in antiretroviral therapy (ART). *AIDS and Behavior*, 22, 939–947. <https://doi.org/10.1007/s10461-017-1759-9>
- Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993). Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption II. *Addiction*, 88, 791–804. <https://doi.org/10.1111/j.1360-0443>
- Sheehan, D. M., Trepka, M. J., & Dillon, F. R. (2015). Latinos in the United States on the HIV/AIDS care continuum by birth country/region: A systematic review of the literature. *International Journal of STD and AIDS*, 26, 1–12. <https://doi.org/10.1177/0956462414532242>
- Simoni, J. M., Kurth, A. E., Pearson, C. R., Pantalone, D. W., Merrill, J. O., & Frick, P. A. (2006). Self-report measures of antiretroviral therapy adherence: A review with recommendations for HIV research and clinical management. *AIDS and Behavior*, 10, 227–245. <https://doi.org/10.1007/s10461-006-9078-6>
- Simoni, J. M., Wiebe, J. S., Sauceda, J. A., Huh, D., Sanchez, G., Longoria, V., et al. (2013). A preliminary RCT of CBT-AD for adherence and depression among HIV-positive Latinos on the U.S.-Mexico Border: The Nuevo Día Study. *AIDS and Behavior*, 17, 2816–2829. <https://doi.org/10.1007/s10461-013-0538-5>
- Uthman, O. A., Magidson, J. F., Safren, S. A., & Nachega, J. B. (2014). Depression and adherence to antiretroviral therapy in low-middle-and high-income countries: A systematic review and meta-analysis. *Current HIV/AIDS Reports*, 3, 291–307. <https://doi.org/10.1007/s11904-014-022-1>
- Wagner, G. J., Goggin, K., Remien, R. H., Rosen, M. I., Simoni, J. M., Bangsberg, D. R., et al. (2011). A closer look at depression and its relationship to HIV antiretroviral adherence. *Annals of Behavioral Medicine*, 42, 352–360. <https://doi.org/10.1007/s12160-011-9295-8>
- WHO Assist Working Group. (2002). The Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST): Development, reliability and feasibility. *Addiction*, 97, 1183–1194. <https://doi.org/10.1046/j.1360-0443.2002.00185.x>
- Zaller, N., Yang, C., Operario, D., Latkin, C., McKirnan, D., O'Donnell, L., et al. (2017). Alcohol and cocaine use among Latino and African American MSM in 6 US cities. *Journal of Substance Abuse Treatment*, 80, 26–32. <https://doi.org/10.1016/j.jsat.2017.06.003>