Study Title: A Novel smartphone-based intervention to support smoking cessation and adherence to antiretroviral therapy among people living with HIV: A pilot randomized clinical trial

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1) **Protocol Title**

A Novel smartphone-based intervention to support smoking cessation and adherence to antiretroviral therapy among people living with HIV: A pilot randomized clinical trial

2) **Objectives***

Our proposed study aims to:

1. We will conduct 3-arm pilot randomized controlled trial (RCT) to test the feasibility, acceptability, and potential efficacy of a combined intervention consisting of an evidence-based MT smoking cessation app "*Crave-to-Quit"* with vDOT app "*emocha*" to improve ART adherence among PLWHIV smokers; and

2. We will conduct a post-intervention process evaluation consisting of semi-structured interviews with select participants to fine-tune the intervention based on feedback from participants for further testing in Phase II large-scale RCT.

   Findings will inform a larger study of the effectiveness of cessation approaches with great potential for translation and dissemination to PLWHIV smokers throughout the US.

3) **Background***

PLWHIV are at high risk for tobacco-related health disparities. Smoking prevalence in PLWHIV is triple that of the general population (47% - 65% vs. 17%, respectively).[1-4] Most PLWHIV smokers are members of marginalized groups (e.g., ethnic minorities, migrants, men who have sex with men),[4] unemployed, and have low social support.[5] Compared to nonsmokers, PLWHIV smokers have threefold the risk of cancers,[6] double the risk of cardiovascular complications,[7] a 6 to 15 years shorter lifespan,[8] and lower self-reported quality of life.[9] In contrast, smoking cessation among PLWHIV reduces the risk of cardiovascular disease by 20%, non-AIDS malignancy by 34%, and overall mortality by 16%.[10] There is also an unmet need to develop innovative smoking cessation interventions for PLWHIV that can: 1) increase their access to treatment, 2) address their unique psychosocial profile, and 3) address the intersection between smoking and adherence to ART.

Two systematic reviews conclude that *Smartphone-based Smoking Cessation Applications (Apps)* are effective and significantly increase access to treatment.[19,20] In addition to their high potential for dissemination, smartphone apps provide a promising

medium to deliver an intervention due to their availability, relatively low cost, and ease of use. Compared to in-person treatment, this approach can be standardized, reduce stigma associated with seeking treatment, allow the use of multiple methods to deliver the intervention (e.g., video, audio), facilitate the integration of the treatment into user's daily life, help tracking user's progress 24/7, and simultaneously boosting user's engagement, a strong predictor of smoking cessation.[21-24]

Depression and craving are two major predictors of smoking relapse in PLWHIV.[28] Depression among PLWHIV is up to three times higher than that in the general population.[29,30] In addition, smoking cessation is a major life stressor and is strongly linked with psychological stress, depression, and negative and positive affect that can lead to relapse.[31,32] One promising strategy for smoking cessation in PLWHIV is *Mindfulness Training* (MT). MT proved to be effective in reducing both self-report and objective indices of negative affect and psychological stress.[33,34] MT also can help smokers control craving by being less emotionally reactive and less prone to relapse related to avoidance of distressing symptoms.[35] In PLWHIV, MT was feasible and effective at improving quality of life, aging, emotional well-being, immunological status, and coping with HIV.[38] Yet, MT for smoking cessation in this population has not been implemented or tested.

Based on the social cognitive theory, self-monitoring is a key component of self-management because it gives patients insight into the dynamic relationship between triggers and the target behavior at the time and in the context in which they occur.[39] Tracking ART intake while quitting smoking can help individuals self-monitor their compliance to treatment, identify triggers to noncompliance, and ultimately improve their adherence to treatment. Video Directly Observed Therapy (vDOT) of patients taking their medications has become a cornerstone to improve adherence to treatment in several diseases (e.g., tuberculosis). Emocha Mobile Health Inc. has recently developed an app "emocha" that uses vDOT following the CDC protocol to improve medication adherence.[40] Several studies have shown that "emocha" can secure medication adherence rates of 90-95%.[41,42] Recently, Dr. Judson Brewer developed an evidence-based mindfulness smoking cessation app "*Crave-to-Quit"* adapted from an in-person MT relapse prevention smoking cessation intervention that proved to be effective in the general population.[43-47] Building on his work, and using a mixed-method approach of quantitative and qualitative research, we propose to: 1) test the feasibility, acceptability, and potential efficacy of a combined intervention consisting of an evidence-based MT smoking cessation app "*Crave-to-Quit"* with vDOT app "*emocha*" to improve ART adherence in a pilot randomized clinical trial (RCT) among PLWHIV smokers; and 2) fine-tune the intervention based on feedback from participants for further testing in Phase II large-scale RCT.

4) Inclusion and Exclusion Criteria*

Those eligible for inclusion area those who:

- ≥ 18 years old,
- have been prescribed ART medication in the prior 6 months
- have smoked ≥ 5 cigarettes/day in the past year
- be interested in making a quit attempt in the next 30 days
- own a smartphone (apple/android), and plan to keep it active for the next 3 months
- read/speak English
- be able to provide consent
- have no plans to move in the next 3 months
- not pregnant or planning to be pregnant in the following 3 months

We will not include any of the following groups:

- Adults unable to consent
- Individuals who are not yet adults (infants, children, teenagers)
- Pregnant women
- Prisoners
- Have contraindication to NRT (past month myocardial infarction, history of serious arrhythmias/or unstable angina pectoris, dermatological disorder),[63]
- Currently being treated for a psychiatric condition.
- Currently being treated for smoking cessation, alcoholism, or illicit drug use

5) **Procedures Involved***

Aim 1: The Clinical Trial

We will be provided with a list of potentially eligible participants including their names, contact information, smoking status, most recent HIV-1 viral load (VL), CD4 count, ART regimen history (e.g., time since first starting ART, current prescription) from the UM HIV Registry (pls. see LOS from Dr. Safren; their IRB # is pending approval of this protocol). This will include HIV Registry participants who have previously given consent to be contacted for future research studies. Eligible participants will be contacted by phone and invited to participate in the study. Those who are interested will be screened. Those who are eligible will be scheduled to attend the orientation session. Those who are not eligible, or decline to participate will be encouraged to quit smoking and given a list of available resources. We will additionally recruit participants at HIV community health centers in Miami. The process here will be the same, where interested participants will be screened for eligibility and scheduled for an orientation session.

Breath carbon monoxide (CO) (for cotinine analysis) will be collected at baseline for participants to confirm their smoking status. The breath sample will be collected with a portable CO monitor (Micro CO™ by Micro Direct, Inc.). Cut-offs of < 8 ppm for CO

and <10 ng/ml for cotinine will be used to determine smoking status (Benowitz et al 2002).

Participants will be assigned to blocks, based on gender. Then, within each block, participants will be randomly assigned to one of three treatment arms:

1. Usual Care (UC)/control: Participants in this group will receive a brief advice to adhere to ART, a brief advice to quit smoking, 6-week supplies of NRT, and self-help materials to quit smoking and adhere to ART.

2. Only smoking cessation intervention (*Crave-to-Quit* app): This intervention is based on the theory of mindfulness-based cognitive therapy (MBCT) for relapse prevention.[64] The MBCT uses cognitive behavioral therapy methods in collaboration with MT techniques. Cognitive methods focuses on the development of personal coping strategies that target solving problems and changing unhelpful patterns in cognitions (e.g. thoughts, beliefs), behaviors, and emotional regulation.[65] MT focus on becoming aware of all incoming thoughts and feelings and accepting them, but not attaching or reacting to them.[36] This process is known as "Decentering" and aids in disengaging from self-criticism and rumination that can arise when reacting to negative thinking patterns.[66] Participants in this group will receive the UC for adherence to ART, one in-person orientation sessions, 6-week supplies of NRT, the "*Crave-to-Quit"* app, and two brief follow-up phone calls.

Orientation session. This session will occur 3 weeks before quit date and will last for 90 min. During the session, a research associate will explain the purpose, format, and procedures of the study. Participants will then watch a video that explains the specifics of their respective arm's study activities; there will be a different video for each of the 3 arms. After the video the research associate will go through the written informed consent, have the participant sign, and have the participant complete the baseline assessment. Then, participants will be instructed to download on their phone the "*Crave-to-Quit"* app and will receive a tutorial explaining the app content and features to troubleshoot any issues, followed by training on how to use the app and to practice MT techniques introduced in the app. Participants will be instructed to start using the app , and the app will assign a quit date within the next 3 weeks. Participants will receive 6 weeks of NRT,[63] and will be instructed to start using the NRT at the quit date. Orientations and collection of consent may be conducted individually or in groups, according to participants' schedules.

The Crave-to-Quit app. The app is comprised of 22 modules for 22 days, 5–15 minutes each, designed to teach MT using audio, video, and animation.[44] Participants have access to only one new module per day, and subsequent days are locked to prevent skipping ahead (pls. see LOS from Ms. Roman from MindSciences). The app teaches three basic formal MT techniques including *Body Scan* (bringing awareness to different parts of the

body to foster awareness of body sensations that constitute cravings and affective states), *Loving-Kindness* (repeating phrases such as "may X be happy" to foster acceptance of oneself and others), *Breath Awareness* (paying attention to the breath wherever one feels it most strongly in the body to help retrain the mind away from habitually engaging in self-related thinking toward a more present-centered awareness), and one informal MT RAIN (Recognize, Accept, Investigate, and Note what cravings feel like as they arise/pass away). In RAIN, participants are asked to identify their smoking trigger, rate their craving, and choose between using RAIN to ride out their craving, or completing an audio-guided exercise to 'smoke mindfully' by paying attention to the moment-to-moment experience and bodily sensations of smoking. The app also includes other features such as social support (quit friend sign-ups, the tip of the week), activity feed (to track interaction with the app), and my morning stats (to track smoking).

Two brief follow-up phone calls. The first phone call will occur one day before the quit date to remind participants about their quit date and provide support. The second will occur at the end of treatment (6 weeks after quit date) to review progress, provide support, and schedule the 3-month follow-up visit.

3. The combined intervention (Crave-to-Quit + emocha apps): In addition to the intervention in the second group, participants in this group will be instructed during the *Orientation Session* to download on their phone the *emocha app* and will receive a tutorial explaining the app content and features. The study team will explain to participants that the app will help them in tracking dose-by-dose medication adherence by recording a video for themselves taking their medication. Participants will be instructed to find a private place to take their medication, make sure their face is well lit when recording, have a clear glass of water, state their name, the date, and each medication as they take it, display their medication pills, show medication in the mouth before swallowing, drink water, show open mouth after swallowing, and repeat the same procedure every time they take the medication. During the 3-month trial, our staff will have full access to the app's web portal to navigate and collect information about patients' adherence to ART (pls. see LOS from emocha Mobile Health Inc.).

At the orientation session, participants will complete a baseline assessment consisting of:

- *Demographics and HIV history.* Age, race/ethnicity, sexual orientation, relationship status, education, employment, income, time since HIV diagnosis, and HIV 1 RNA VL (from medical chart), ART regimen history, time since first starting ART, current ART prescription,[72] VAS for adherence to ART.[61,62]
- *Smoking*. Smoking history, past quit attempt, motivation to quit, confidence in quitting, Fagerström test for nicotine dependence,[73] 12-item smoking self-efficacy to resist urge to smoke,[74] and 15-item Minnesota nicotine withdrawal scale (i.e., craving, irritability, anxiety, depression).[75]

- *Mindfulness skills*: The five facet MT questionnaire that measures MT skills related to observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience.[76]
- *Others. The 10-item Centers for the Epidemiologic Study of Depression (CES-D) scale,*[77] social support,[78] quality of life,[79] and alcohol and substance use (ASSIST).[80]

Participants will receive $50 for completing the baseline assessment.

All participants will receive one in-person follow-up assessment at 3 months after enrollment to assess their smoking status and adherence to ART as well as get information about concomitant smoking and NRT use, use of additional NRT or cessation drugs (e.g., bupropion), and use of other tobacco methods. Breath CO (for cotinine analysis) will be collected at the 3-month follow-up points for participants who report abstinence. The breath sample will be collected with a portable CO monitor (Micro CO™ by Micro Direct, Inc.). Cut-offs of 8 ppm for CO and 10 ng/ml for cotinine will be used to determine abstinence (Benowitz et al 2002).

The following will be assessed at the three-month intervention:

- All baseline assessments except demographics.
- *Usability and engagement.* The absolute number of times logged into the apps will be calculated for each user to obtain the mean number of using each app. Two items also will be assessed "self-reported number of completed days for each app," and level of comfort with the app "I am comfortable using the app." Participants in Arms 2 & 3 will also complete The System Usability Scale (SUS) at call 1 & 2 and the 3-month follow-up to evaluate the overall usability of and satisfaction with the app (John Brooke, 1986).
- Acceptability. The acceptability will be assessed by 3 items "How satisfied were you with the intervention?", "How likely are you to recommend this intervention to a friend?" and "How useful was the intervention?"
- *Feasibility.* We will monitor rates of recruitment and effort required (e.g. number of staff hours) as well as the number of screenings conducted, proportion eligible, and proportion who agree to enroll. Feasibility of recruitment will be operationalized as an enrollment rate of 70% or higher (an established standard in the RCT literature). We will also record number of rescheduled, cancelled, and missed assessment visits as well as received visits/calls in each treatment arm to inform estimation of staffing needs and retention protocols for a planned efficacy RCT. Other outcomes are rate of attrition (not having a final visit at the end of treatment), rates of several categories of attrition (mortality, withdrawal from the study, transfer to non-study clinics, loss to follow-up without identifiable cause), and response rates to questionnaires (operationalized as 70% or higher), adherence/compliance rates (operationalized as completing at least 70% of the app's module in arm 2 & 3), and time needed to collect and analyze data.

- *Smoking Cessation.* Main Smoking cessation outcome is 7-day point-prevalent abstinence (defined as self-report of not smoking in the past 7-days; not even a puff) confirmed by breath CO cotinine level of < 10 ng/ml at the 3-month follow up. Secondary outcome is the reduction in number of cigarettes smoked per day.[81,82] Relapse is defined as smoking at least once/week on two consecutive weeks.[83] *Adherence to ART. ≥95%* adherence to ART (using VAS).[70]

Participants will receive $50 for completing the three-month assessment.

As an evaluation of the feasibility of the app-based intervention, we will call participants in Arms 2 & 3 once a week for 3 weeks to ask a brief set of questions about their mindfulness practice and use and opinions of the app. Participants will receive $5 per each of these 3 calls they complete (for a total of up to $15). From these two arms, we will randomnly select 6 participants that will be asked to complete daily, instead of weekly calls, for a period of 3 weeks; they will receive $5 per each call for a total of up to $105 ($5 per call x 21 calls).

We will use Google Voice to communicate with participants via text for reminders (ex: appointments scheduled, using the apps on schedule, phone call reminders, follow-up reminders). These texts will not mention "HIV", only that it is part of a research study.

Aim 2. Post-intervention Process Evaluation

After the intervention, in-person semi-structured post-intervention evaluation interviews will be conducted with participants from the "Crave-to-quit + emocha" and "only crave-to-quit" groups to further inform our assessment of acceptability and perceived helpfulness of interventions, and identifying key areas for refining the intervention protocols (e.g., improving access, content, usability). Participants will receive a $50 incentive for participating. This interview will be audio-recorded and transcribed and may take place the same day of the 3-month follow up visit or on a separate date.

6) Data and Specimen Banking*

7) Data Management*

Participant paper assessments will be stored in a locked filing cabinet in CRB 942. Data from the surveys will be entered into and stored in REDCap, accessed only by approved study personnel. Data will be downloaded and entered into a statistical software program for analysis. Audio files and transcripts from the post-intervention evaluation will be saved in Box and accessed only by approved study personnel.

8) Risks to Subjects*

The risks associated with participating in this study are those related to answering basic questions about demographic characteristics and smoking behaviors. Participants will be

assured that their data and any audio recordings will be kept confidential and that they are free to not answer any questions.

9) Potential Benefits to Subjects*

Participants may be able to quit smoking through use of the intervention in the study.

10) Vulnerable Populations*

Those with HIV.

11) Setting

The study will take place at the Don Soffer Clinical Research Center, the Infectious Disease Research Unit, and Miami HIV community health centers.

12) Resources Available

The PI of the study, Dr. Taghrid Asfar, has many years' experience in conducting tobacco control studies. Dr. Lee is also specialized in tobacco control. Dr. Alcaide, the Director of the UM HIV Research Unit in the Department of Infectious Diseases, has expertise in HIV research, and will assist in coordinating recruitment.

13) Prior Approvals

Letters of Support from Drs. Safren at the UM HIV Registry and Dr. Alcaide from the Behavioral CFAR Core are attached.

14) Recruitment Methods

We are collaborating with Drs. Safren (the Director of the UM HIV Registry) and Alcaide (Co-I; the Director of the UM HIV Research Unit) to recruit those who were identified as smokers in their database and have agreed to participate in future research (pls. see LOS from Drs. Safren and Alcaide). We will be provided with a list of potential participants including their names, contact information, smoking status, most recent HIV-1 viral load (VL), and ART regimen history (e.g., time since first starting ART, current prescription). This will include HIV Registry participants who have previously given consent to be contacted for future research studies. Eligible participants will be contacted by phone and invited to participate in the study. Those who are interested will be screened. Those who are eligibility will be scheduled to attend the orientation session. Those who are not eligible, or decline to participate will be encouraged to quit smoking and given a list of available resources. We will additionally recruit participants at HIV community health centers in Miami. The process here will be the same, where interested participants will be screened for eligibility and scheduled for an orientation session.

15) Local Number of Subjects

We will recruit up to 75 participants.

16) Confidentiality

All participant data will be stored in a locked cabinet or in REDCap and accessed only by approved study personnel. Their name will be replaced with an ID number on their survey data and a key linking the two will be available only to approved research personnel and only for purposes of contacting them as needed in the study. Their name will not be associated with interview transcripts. Audio files from the interviews and electronic files such as verbal consents will be stored in Box and accessed only by approved study personnel.

17) Provisions to Protect the Privacy Interests of Subjects

Participants can be assured that the personal information they provide will only be seen by approved research staff and they will not be identified in any publication.

18) Consent Process

We will obtain verbal consent over the phone to participate and be scheduled for an orientation session by a research associate. We will obtain written consent from participants at the orientation session to participate in all study activities including phone calls, the 3-month follow-up visit and the post-intervention visit. We will obtain a separate audio/video consent form at the orientation session as well so we may record the study visits.

References

1. CDC. Cigarette smoking among adults—United States, 2005–2015. *Morbidity and Mortality Weekly Report.* 2016;65(44):1205-1211.
2. Burkhalter JE, Springer CM, Chhabra R, Ostroff JS, Rapkin BD. Tobacco use and readiness to quit smoking in low-income HIV-infected persons. *Nicotine & Tobacco Research.* 2005;7(4):511-522.
3. Tesoriero JM, Gieryic SM, Carrascal A, Lavigne HE. Smoking among HIV positive New Yorkers: prevalence, frequency, and opportunities for cessation. *AIDS and Behavior.* 2010;14(4):824-835.
4. Pool ER, Dogar O, Siddiqi K. Interventions for tobacco use cessation in people living with HIV and AIDS. *status and date: New, published in.* 2014(5).
5. Humfleet GL, Delucchi K, Kelley K, Hall SM, Dilley J, Harrison G. Characteristics of HIV-positive cigarette smokers: a sample of smokers facing multiple challenges. *AIDS Education and Prevention.* 2009;21(3_supplement):54-64.
6. Clifford GM, Polesel J, Rickenbach M, et al. Cancer risk in the Swiss HIV Cohort Study: associations with immunodeficiency, smoking, and highly active antiretroviral therapy. *Journal of the National Cancer Institute.* 2005;97(6):425-432.
7. Calvo-Sánchez M, Perelló R, Perez I, et al. Differences between HIV-infected and uninfected adults in the contributions of smoking, diabetes and hypertension to acute coronary syndrome: two parallel case–control studies. *HIV medicine.* 2013;14(1):40-48.
8. Helleberg M, Afzal S, Kronborg G, et al. Mortality attributable to smoking among HIV-1–infected individuals: a nationwide, population-based cohort study. *Clinical Infectious Diseases.* 2012;56(5):727-734.
9. Crothers K, Griffith TA, McGinnis KA, et al. The impact of cigarette smoking on mortality, quality of life, and comorbid illness among HIV-positive veterans. *Journal of general internal medicine.* 2005;20(12):1142-1145.
10. Lifson AR, Neuhaus J, Arribas JR, et al. Smoking-related health risks among persons with HIV in the Strategies for Management of Antiretroviral Therapy clinical trial. *American journal of public health.* 2010;100(10):1896-1903.
11. Shuter J, Bernstein SL, Moadel AB. Cigarette smoking behaviors and beliefs in persons living with HIV/AIDS. *American journal of health behavior.* 2012;36(1):75-85.
12. Robinson W, Moody-Thomas S, Gruber D. Patient perspectives on tobacco cessation services for persons living with HIV/AIDS. *AIDS care.* 2012;24(1):71-76.
13. Crothers K, Goulet JL, Rodriguez-Barradas MC, et al. Decreased awareness of current smoking among health care providers of HIV-positive compared to HIV-negative veterans. *Journal of general internal medicine.* 2007;22(6):749-754.
14. Matthews AK, Vargas M, Kuhns L, Shappiva N, King AC. A qualitative examination of barriers and motivators to smoking cessation among HIV positive African American MSM smokers. *Journal of Health Disparities Research and Practice.* 2014;7(2):4.
15. Shuter J, Bernstein SL. Cigarette smoking is an independent predictor of nonadherence in HIV-infected individuals receiving highly active antiretroviral therapy. *Nicotine & Tobacco Research.* 2008;10(4):731-736.
16. Webb MS, Vanable PA, Carey MP, Blair DC. Medication adherence in HIV-infected smokers: the mediating role of depressive symptoms. *AIDS Education and prevention.* 2009;21(3_supplement):94-105.
17. O'Cleirigh C, Valentine SE, Pinkston M, et al. The unique challenges facing HIV-positive patients who smoke cigarettes: HIV viremia, ART adherence, engagement in HIV care, and concurrent substance use. *AIDS and Behavior.* 2015;19(1):178-185.

18. Feldman JG, Minkoff H, Schneider MF, et al. Association of cigarette smoking with HIV prognosis among women in the HAART era: a report from the women's interagency HIV study. *American journal of public health.* 2006;96(6):1060-1065.
19. Haskins BL, Lesperance D, Gibbons P, Boudreaux ED. A systematic review of smartphone applications for smoking cessation. *Translational behavioral medicine.* 2017;7(2):292-299.
20. Regmi K, Kassim N, Ahmad N, Tuah N. Effectiveness of mobile apps for smoking cessation: A review. *Tob Prev Cessation.* 2017;3:1-11.
21. Shahab L, McEwen A. Online support for smoking cessation: a systematic review of the literature. *Addiction.* 2009;104(11):1792-1804.
22. Bricker JB, Mull KE, Kientz JA, et al. Randomized, controlled pilot trial of a smartphone app for smoking cessation using acceptance and commitment therapy. *Drug & Alcohol Dependence.* 2014;143:87-94.
23. Richardson A, Graham AL, Cobb N, et al. Engagement promotes abstinence in a web-based cessation intervention: cohort study. *Journal of medical Internet research.* 2013;15(1).
24. Civljak M, Sheikh A, Stead LF, Car J. Internet-based interventions for smoking cessation. *Cochrane Database Syst Rev.* 2010;9(9).
25. Pew Internet and American Life Project. Americans' Views on Mobile Etiquette. Chapter 1: Always on Connectivity. : . 2015; http://www.pewinternet.org/2015/08/26/chapter-1-always-on-connectivity/.
26. Sharpe JD, Zhou Z, Escobar-Viera CG, et al. Interest in using mobile technology to help self-manage alcohol use among persons living with the human immunodeficiency virus: A Florida Cohort cross-sectional study. *Substance abuse.* 2018;39(1):77-82.
27. Fagan P, King G, Lawrence D, et al. Eliminating tobacco-related health disparities: directions for future research. *American Journal of Public Health.* 2004;94(2):211-217.
28. Koszycki D, Benger M, Shlik J, Bradwejn J. Randomized trial of a meditation-based stress reduction program and cognitive behavior therapy in generalized social anxiety disorder. *Behaviour Research and Therapy.* 2007;45(10):2518-2526.
29. De Francesco D, Underwood J, Post FA, et al. Defining cognitive impairment in people-living-with-HIV: the POPPY study. *BMC infectious diseases.* 2016;16(1):617.
30. Nanni MG, Caruso R, Mitchell AJ, Meggiolaro E, Grassi L. Depression in HIV infected patients: a review. *Current psychiatry reports.* 2015;17(1):530.
31. Cinciripini PM, Wetter DW, Fouladi RT, et al. The effects of depressed mood on smoking cessation: Mediation by postcessation self-efficacy. *Journal of consulting and clinical psychology.* 2003;71(2):292.
32. Borrelli B, Niaura R, Keuthen NJ, Goldstein MG. Development of major depressive disorder during smoking-cessation treatment. *The Journal of clinical psychiatry.* 1996.
33. Davidson RJ, Kabat-Zinn J, Schumacher J, et al. Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic medicine.* 2003;65(4):564-570.
34. Baer RA. Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical psychology: Science and practice.* 2003;10(2):125-143.
35. Elwafi HM, Witkiewitz K, Mallik S, Thornhill IV TA, Brewer JA. Mindfulness training for smoking cessation: Moderation of the relationship between craving and cigarette use. *Drug & Alcohol Dependence.* 2013;130(1):222-229.
36. Kabat-Zinn J. *Wherever you go, there you are: Mindfulness meditation in everyday life.* Hachette Books; 2009.
37. Malinowski P. Neural mechanisms of attentional control in mindfulness meditation. *Frontiers in neuroscience.* 2013;7:8.

38. Riley KE, Kalichman S. Mindfulness-based stress reduction for people living with HIV/AIDS: preliminary review of intervention trial methodologies and findings. *Health psychology review.* 2015;9(2):224-243.
39. Bandura A. Social cognitive theory of self-regulation. *Organizational behavior and human decision processes.* 1991;50(2):248-287.
40. CDC. Implementing an Electronic Directly Observed Therapy (eDOT) Program: A Toolkit for Tuberculosis (TB) Programs. 2017; https://www.cdc.gov/tb/publications/guidestoolkits/tbedottoolkit.htm.
41. Morris S, Miner M, Rodriguez T, Stancil R, Wiltz-Beckham D, Chorba T. Notes from the Field: Tuberculosis Control Activities After Hurricane Harvey—Texas, 2017. *MMWR Morbidity and mortality weekly report.* 2017;66(49):1362.
42. Holzman SB, Zenilman A, Shah M. Advancing Patient-Centered Care in Tuberculosis Management: A Mixed-Methods Appraisal of Video Directly Observed Therapy. Paper presented at: Open forum infectious diseases2018.
43. Brewer JA, Mallik S, Babuscio TA, et al. Mindfulness training for smoking cessation: results from a randomized controlled trial. *Drug & Alcohol Dependence.* 2011;119(1):72-80.
44. Garrison KA, Pal P, Rojiani R, Dallery J, O'Malley SS, Brewer JA. A randomized controlled trial of smartphone-based mindfulness training for smoking cessation: a study protocol. *BMC psychiatry.* 2015;15(1):83.
45. Brewer JA, Elwafi HM, Davis JH. Craving to quit: Psychological models and neurobiological mechanisms of mindfulness training as treatment for addictions. 2014.
46. Garrison KA, Pal P, O'Malley SS, et al. Craving to Quit: A Randomized Controlled Trial of Smartphone app-based Mindfulness Training for Smoking Cessation. *Nicotine & Tobacco Research.* 2018.
47. Furberg RD, Uhrig JD, Bann CM, et al. Technical implementation of a multi-component, text message–based intervention for persons living with HIV. *JMIR research protocols.* 2012;1(2).
48. Department of Health and Human Services. Improving Smoking Cessation in Socioeconomically Disadvantaged Populations via Scalable Interventions (R01 Clinical Trial Optional). https://grants.nih.gov/grants/guide/pa-files/PAR-18-251.html.
49. Carrico AW, Nil E, Sophal C, et al. Behavioral interventions for Cambodian female entertainment and sex workers who use amphetamine-type stimulants. *Journal of behavioral medicine.* 2016;39(3):502-510.
50. Carrico AW, Woods WJ, Siever MD, et al. Positive affect and processes of recovery among treatment-seeking methamphetamine users. *Drug & Alcohol Dependence.* 2013;132(3):624-629.
51. Carrico AW, Moskowitz JT. Positive affect promotes engagement in care after HIV diagnosis. *Health Psychology.* 2014;33(7):686.
52. Carrico AW, Jain J, Discepola MV, et al. A community-engaged randomized controlled trial of an integrative intervention with HIV-positive, methamphetamine-using men who have sex with men. *BMC public health.* 2016;16(1):673.
53. Carrico AW, Gómez W, Siever MD, Discepola MV, Dilworth SE, Moskowitz JT. Pilot randomized controlled trial of an integrative intervention with methamphetamine-using men who have sex with men. *Archives of sexual behavior.* 2015;44(7):1861-1867.
54. Carrico AW, Nation A, Gómez W, et al. Pilot trial of an expressive writing intervention with HIV-positive methamphetamine-using men who have sex with men. *Psychology of Addictive Behaviors.* 2015;29(2):277.
55. Mason AE, Jhaveri K, Cohn M, Brewer JA. Testing a mobile mindful eating intervention targeting craving-related eating: feasibility and proof of concept. *Journal of behavioral medicine.* 2018;41(2):160-173.

56. The National Center for Complementary and Integrative Health. Framework for Developing and Testing Mind and Body Interventions. 2017; https://nccih.nih.gov/grants/mindbody/framework.
57. Asfar T, Klesges RC, Sanford SD, et al. Trial design: The St. Jude Children's Research Hospital Cancer Survivors Tobacco Quit Line study. *Contemp Clin Trials.* 2010;31(1):82-91.
58. Asfar T, Weg MV, Maziak W, Hammal F, Eissenberg T, Ward KD. Outcomes and adherence in Syria's first smoking cessation trial. *Am J Health Behav.* 2008;32(2):146-156.
59. Ward KD, Asfar T, Al Ali R, et al. Randomized trial of the effectiveness of combined behavioral/pharmacological smoking cessation treatment in Syrian primary care clinics. *Addiction.* 2012:n/a-n/a.
60. Asfar T, Al Ali R, Rastam S, Maziak W, Ward KD. Behavioral Cessation Treatment of Waterpipe Smoking: The First Pilot Randomized Controlled Trial. *Addictive Behaviors.* 2014.
61. Kalichman SC, Amaral CM, Swetzes C, et al. A simple single-item rating scale to measure medication adherence: further evidence for convergent validity. *Journal of the International Association of Physicians in AIDS Care.* 2009;8(6):367-374.
62. Amico KR, Fisher WA, Cornman DH, et al. Visual analog scale of ART adherence: association with 3-day self-report and adherence barriers. *JAIDS Journal of Acquired Immune Deficiency Syndromes.* 2006;42(4):455-459.
63. Fiore MC, Jaén CR, Baker TB, et al., eds. *Treating Tobacco Use and Dependence: 2008 Update. Clinical Practice Guideline.* Rockville, MD: U.S. Department of Health and Human Services 2008. Quality AfHRa, ed.
64. Sipe WE, Eisendrath SJ. Mindfulness-based cognitive therapy: theory and practice. *The Canadian Journal of Psychiatry.* 2012;57(2):63-69.
65. Beck JS. *Cognitive behavior therapy: Basics and beyond.* Guilford press; 2011.
66. Hayes SC, Villatte M, Levin M, Hildebrandt M. Open, aware, and active: Contextual approaches as an emerging trend in the behavioral and cognitive therapies. *Annual review of clinical psychology.* 2011;7:141-168.
67. Rebagliato M. Validation of self reported smoking. *Journal of Epidemiology and Community Health.* 2002;56(3):163-164.
68. Centers for Disease Control and Prevention, National Center for Environmental Health. *National report on human exposure to environmental chemicals.* Atlanta2001.
69. Asfar T, Caban-Martinez AJ, McClure LA, et al. A cluster randomized pilot trial of a tailored worksite smoking cessation intervention targeting Hispanic/Latino construction workers: Intervention development and research design. *Contemporary clinical trials.* 2018;67:47-55.
70. Wood E, Hogg RS, Yip B, Harrigan PR, O'Shaughnessy MV, Montaner JS. Effect of medication adherence on survival of HIV-infected adults who start highly active antiretroviral therapy when the CD4+ cell count is 0.200 to 0.350× 109 cells/L. *Annals of internal medicine.* 2003;139(10):810-816.
71. Sechrest et al. *Evaluation of treatment program.* 1979.
72. Walsh JC, Mandalia S, Gazzard BG. Responses to a 1 month self-report on adherence to antiretroviral therapy are consistent with electronic data and virological treatment outcome. *Aids.* 2002;16(2):269-277.
73. Heatherton TF, Kozlowski LT, Frecker RC, FAGERSTROM KO. The Fagerström test for nicotine dependence: a revision of the Fagerstrom Tolerance Questionnaire. *Addiction.* 1991;86(9):1119-1127.
74. Etter JF, Bergman MM, Humair JP, Perneger TV. Development and validation of a scale measuring self-efficacy of current and former smokers. *Addiction.* 2000;95(6):901-913.
75. Hughes JR. Effects of abstinence from tobacco: valid symptoms and time course. *Nicotine & Tobacco Research.* 2007;9(3):315-327.

76. Baer RA, Smith GT, Allen KB. Assessment of mindfulness by self-report: The Kentucky Inventory of Mindfulness Skills. *Assessment.* 2004;11(3):191-206.

77. Radloff LS. The CES-D scale: A self-report depression scale for research in the general population. *Applied psychological measurement.* 1977;1(3):385-401.

78. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. *Journal of personality assessment.* 1988;52(1):30-41.

79. Stevanovic D. Quality of Life Enjoyment and Satisfaction Questionnaire–short form for quality of life assessments in clinical practice: A psychometric study. *Journal of Psychiatric and Mental Health Nursing.* 2011;18(8):744-750.

80. Humeniuk R, Ali R, Babor TF, et al. Validation of the alcohol, smoking and substance involvement screening test (ASSIST). *Addiction.* 2008;103(6):1039-1047.

81. Asfar T, Ebbert JO, Klesges RC, Relyea GE. Do smoking reduction interventions promote cessation in smokers not ready to quit? *Addictive Behaviors.* 2011;36(7):764-768.

82. Asfar T, Ebbert JO, Klesges RC, Klosky JL. Use of smoking reduction strategies among U.S. tobacco quitlines. *Addictive Behaviors.* 2012;37(4):583-586.

83. Hughes JR, Hatsukami D. Signs and Symptoms of Tobacco Withdrawal. *Archives of General Psychiatry.* 1986;43(3):289-294.

84. Kraemer HC, Mintz J, Noda A, Tinklenberg J, Yesavage JA. Caution regarding the use of pilot studies to guide power calculations for study proposals. *Archives of general psychiatry.* 2006;63(5):484-489.

85. Browne RH. On the use of a pilot sample for sample size determination. *Statistics in Medicine.* 1995;14(17):1933-1940.

86. Klesges RC, Brown K, Pascale RW, Murphy M, Williams E, Cigrang JA. Factors associated with participation, attrition, and outcome in a smoking cessation program at the workplace. *Health Psychol.* 1988;7(6):575.