Published in final edited form as:

J Subst Abuse Treat. 2016 April ; 63: 39–45. doi:10.1016/j.jsat.2015.12.002.

A Pilot Study of a Readiness Group to Increase Initiation of Smoking Cessation Services among Women in Residential Addiction Treatment

Joseph Gwydish¹, Valerie A. Gruber², Thao Le¹, Barbara Tajima¹, K. Blakely Andrews¹, Hannah Leo³, Shaina Zura⁴, Roland Miller⁴, and Janice Y. Tsoh²

¹Philip R. Lee Institute for Health Policy Studies, University of California San Francisco (UCSF)

²UCSF Department of Psychiatry

³Yale University

⁴HealthRight 360

Abstract

This study implemented a smoking cessation Readiness Group (RG) in two women-focused residential substance abuse treatment programs, with the aim of engaging women in smoking cessation services. The primary outcome was defined as attending at least one cessation group after the RG ended. The RG combined features of the Expert Systems (ES) approach with a practice quit attempt. ES is an interactive system which tailors intervention to the smokers' stage of change, while the practice quit attempt rehearses the process of quitting smoking. As a secondary aim we tested whether incentives, used to promote participation and engagement in the RG, would increase initiation of smoking cessation services. Participants (N = 75) were women smokers enrolled in two residential programs, and intention to quit smoking was not required for participation. Twelve participant cohorts were randomly assigned to receive the RG with or without incentives. Following the RG intervention, 38.7% of participants (n = 29) attended at least one smoking cessation session. Both the number of RG sessions attended and a successful practice quit attempt predicted the later use of cessation services, while incentives did not. From pre to post RG, participants reported decreased cigarettes per day (CPD: 11.8 v. 7.6, $p < .0001$) and decreased nicotine dependence as measured by the Heaviness Smoking Index (HSI: 2.3 v. 1.8, $p < .001$). The 3-session group-format RG intervention was associated with initiation of smoking cessation services and with changes in smoking behavior.

Smoking prevalence in the U.S. has declined from 40% in 1964 to 17.8% currently (Jamal et al., 2014; U.S. Department of Health Education and Welfare, 1964). However, persons with either a mental disorder or substance abuse disorder are twice as likely to smoke as those without (Lasser et al., 2000). Smokers with other drug addictions smoke more heavily (Hughes, 2002; Sobell, 2002) and are less successful in their attempts to quit smoking

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(Drobes, 2002; Joseph, Nichol, & Anderson, 1993). They experience greater tobacco-related mortality than the general population (Bandiera, Anteneh, Le, Delucchi, & Guydish, 2015) and are more likely to die from tobacco-related causes than from other drug-related causes (Hurt et al., 1996). While smoking prevalence is higher among persons with substance use disorders (Grant, Hasin, Chou, Stinson, & Dawson, 2004; Lasser et al., 2000), it is highest among those in substance abuse treatment. National Survey on Drug Use and Health data show that smoking prevalence among persons who received past year drug treatment, for 2006 – 2011, ranged from 72.6% to 74.5% (Guydish, Yu, Le, Pagano, & Delucchi, 2015).

Quitting smoking does not jeopardize recovery from other drug use (Kalman, Kim, DiGirolamo, Smelson, & Ziedonis, 2010; Martin et al., 1997; Stuyt, 1997). Smoking cessation during the first year after admission to addiction treatment was associated with improved drug use outcomes in one study (Tsoh, Chi, Mertens, & Weisner, 2011), and a meta-analysis found that patients receiving tobacco intervention during addiction treatment had a 25% higher likelihood of abstinence from other drugs (J. J. Prochaska, Delucchi, & Hall, 2004). However, smoking cessation intervention achieves modest quit rates in this population. In general population smokers, Fiore et al. (2008) estimated that 7-day point prevalence abstinence rates at 6 months were 14.6% for counseling interventions, 21.7% for medication interventions, and 27.6% for interventions using both approaches. In comparison, a meta-analysis of studies of smokers who received addiction treatment reported 12% post-treatment smoking abstinence (J. J. Prochaska et al., 2004). Another review reported 6-month tobacco abstinence rates from 2% – 18% in drug treatment samples (Baca & Yahne, 2009).

Smoking is not addressed in most substance abuse treatment programs (Friedmann, Jiang, & Richter, 2008; Fuller et al., 2007; Knudsen & Studts, 2011; Richter, Choi, McCool, Harris, & Ahluwalia, 2004). Barriers to smoking cessation in these settings include resource limitations, lack of reimbursement, and elevated rates of staff smoking (Guydish, Passalacqua, Tajima, & Manser, 2007). When asked directly, many clients express interest in quitting (Orleans & Hutchinson, 1993; Saxon, McGuffin, & Walker, 1997). However some staff feel that patients are not interested in quitting (Hahn, Warnick, & Plemmons, 1999), and some patients believe that quitting smoking may make it harder to stop other drug use (Asher et al., 2003). About half of smokers enrolled in addiction treatment have tried to quit within the past year (Martinez, Guydish, Le, Tajima, & Passalacqua, 2015). These findings suggest that, in addition to organizational and policy-level interventions, patient-level motivation may be needed to improve the uptake of cessation interventions.

Some motivational approaches used in smoking cessation are Expert System (ES: J. O. Prochaska, Velicer, Fava, Rossi, & Tsoh, 2001), motivational incentives (also called contingency management), and the practice quit attempt (Carpenter, Alberg, Gray, & Saladin, 2010). ES is an interactive system, based on the Transtheoretical model, which tailors intervention to the smokers' stage of change. ES delivers a computer-generated personalized feedback report with suggestions for actions based on the individual's stage of change and provides decisional balance (pros and cons) with respect to smoking (J. O. Prochaska, Velicer, Fava, Rossi, & Tsoh, 2001). ES has been effective in treating smokers at different stages of readiness to quit (J. O. Prochaska, Velicer, Fava, Rossi, & Tsoh, 2001; W.

F. Velicer, Prochaska, & Redding, 2006; W. F. Velicer, Redding, Sun, & Prochaska, 2007), and in various settings (Hall et al., 2006; J. O. Prochaska et al., 2008). Motivational incentives are external rewards contingent on goal-related behaviors. One study in residential addiction treatment provided incentives up to \$10 for consecutive negative daily carbon monoxide (CO) tests (Robles et al., 2005). Smoking abstinence increased, but voucher costs averaged \$526 per participant. In another study prize draws escalated with consecutive negative COs, yielding more smoking reduction, but not more cessation, compared to controls (Alessi, Petry, & Urso, 2008). Last, Carpenter and colleagues pioneered the practice quit attempt as a way to rehearse for a quit attempt without the pressure of quitting smoking for good (Carpenter, Alberg, Gray, & Saladin, 2010). In a randomized trial, the practice quit attempt in conjunction with NRT achieved higher rates of making a quit attempt (49% v. 40%) compared to a practice quit attempt without NRT (Carpenter et al., 2011).

The pilot study reported here began in consultation with the leadership of HealthRight 360 (HR360), a 501(c) 3 non-profit agency providing behavioral health services to indigent Californians. HR360 program directors wanted to address smoking, but observed that patients were often not ready or not interested to quit. We developed a three-session Smoking Cessation Readiness Group (RG) using ES strategies combined with a practice quit attempt. The aim was to engage smokers in smoking cessation, and the primary outcome was initiation of smoking cessation services. Second, in a pilot randomized trial we assessed whether the addition of incentives for participation in the RG would improve initiation of smoking cessation services.

Methods

Setting

HR360 prioritized two women-focused residential programs for study participation. The Female Offender Treatment and Education Program (FOTEP) serves women who are paroling from state prisons, have substance abuse and trauma issues, and may be interested in reunifying with their children. The program has the capacity to serve 63 adult women and 15 children, ages 0–12. The focus is on issues specific to female offenders, including trauma, communication, parenting, family reunification, development of pro-social behavior, exploration of issues which drive substance abuse and criminal behavior, and educational and vocational preparation. Women may remain in the FOTEP program up to 15 months, and the median length of stay is about 3 months (87 days). The Women's Residential Behavioral Health Treatment program is a 64-bed gender-responsive and trauma-informed program, with services designed to address substance use, trauma, mental illness, health and wellness, medication support, spirituality, family reunification, employability, homelessness, and sober living skills. Women may remain in this program up to 6 months, and the median length of stay is about 2 months (53 days). A third site houses a computer lab and group meeting space where most of the data collection, ES sessions, and readiness and cessation groups were held.

Participants

Eligible participants were women in each of the residential programs who had been in treatment for at least 2 weeks, self-identified as current smokers, reported smoking on a daily basis, were not currently pregnant, and were willing to participate in the readiness intervention.

Study Design

Participants were enrolled in a total of 12 RG cohorts according to the time of enrollment. Cohorts were randomly pre-assigned, using a random number generator, to either the incentive (n = 6 cohorts) or control (n = 6 cohorts) condition. Research staff, the RG leader, and clients were blinded to condition until baseline data collection was completed. The day before the RG was to begin, the RG leader was informed of the incentive condition. Participants learned of the group condition at the first RG session. Cohorts ranged in size from 2 to 11, with a median of 7 per cohort. Smoking behavior was measured in a pre-post design, before and after the RG intervention.

The Smoking Cessation Readiness Group (RG)

The pilot RG intervention is guided by the Transtheoretical Model, which conceptualizes individual stages of change to both understand and modify behavior (W.F. Velicer, Prochaska, Fava, Laforge, & Rossi, 1999). However the RG also incorporates a practice quit attempt, similar to the cognitive-behavioral concept of a behavioral experiment, in which the participant rehearses a particular behavior (Carpenter et al., 2010). In the incentive condition, the RG intervention incorporates behavioral theory and operant conditioning (Stitzer, Petry, & Peirce, 2010). The RG is a multi-intervention package consisting of personalized normative feedback, didactic presentation, skills training personalized to stage of change, a facilitated personalized quit attempt supported by access to NRT and, in one condition, incentives.

Each RG participant completed a computerized ES assessment, at baseline, and received a computer-generated personalized feedback report. The RG was designed to support participants in working through the ES Personalized Activities Center (PAC) activities and resources. In many residential treatment programs, patient access to computers and phones is restricted for clinical reasons. In the study programs, computer access required staff permission as well as coordination of the patient's clinical schedule and computer availability. Because of these practical considerations, the ES intervention was modified. The ES assessments at baseline and 30 days were completed by patients online. All other ES-related activities were conducted either in the RG or as homework between sessions, using paper printouts of PAC activities. Session one introduced handouts from PAC Activities specific to each stage of change (e.g. "Take small steps," "Change your image", and "Overcome the cons" for the contemplation stage), and later sessions introduced PAC handouts that were relevant to all stages of change. Worksheets were provided for participants to write brief notes about their PAC handout related activities, next steps, and questions. The second purpose of the Readiness Group was to support participants in a quit attempt with NRT. Therefore, in addition to materials from ES, participants received

handouts with NRT information and instructions. An intervention manual is available at <http://addiction.ucsf.edu/>.

Session one began with discussion of participant ES personalized feedback reports, including their stage of change for smoking cessation, and ES-recommended goals and strategies for change. NRT use was discussed as a resource for the practice quit attempt. Contraindications to NRT were discussed, preferences for product type were assessed (patch, gum, or lozenges), and dosage was determined per package instructions. At the end of the session, participants were offered PAC Activities handouts (based on their stage of change), and each participant was instructed to select three activities as homework.

In session two, the facilitator reviewed worksheet completion, then elicited discussion of the completed PAC activities. This session focused on preparation for the optional 24 hour practice quit attempt. For homework, participants were instructed to read NRT instructions for the type of NRT they requested, as well as PAC handouts on withdrawal symptoms and cravings. Because all medications are controlled in these programs, participants received NRT in an envelope and brought it to the program medication room for storage and distribution.

In session three, the facilitator reviewed homework, participants discussed their experiences with the practice quit attempt, and expired CO was measured for those who made a quit attempt. The group then completed the PAC handout entitled “100 Benefits of Quitting” and discussed how to continue the change process after this final session. The facilitator provided information about the California Quitline, and about the optional smoking cessation group.

Motivational Incentives—In addition to the RG components described above, participants in the incentive cohorts received a \$5 gift card for participation in each session. In sessions two and three they also received a \$5 gift card for completing homework, and a \$10 gift card if they made a successful quit attempt. While the standard cutoff to establish smoking abstinence is 8 parts per million (ppm) (SRNT Subcommittee on Biochemical Verification, 2002), we used a relaxed cutoff (9 ppm) to define successful practice quit attempts. Participants who met all participation, homework and quit attempt criteria received a \$5 consistency bonus. The total possible incentive was \$40 per participant.

Measures

The primary outcome was whether participants did or did not initiate smoking cessation treatment, defined as attending at least one smoking cessation group. In addition, participants reported demographic characteristics and the number of weeks they had been in the treatment program. Participants also reported the number of cigarettes per day (CPD), and number of quit attempts in the past year (defined as stopping smoking voluntarily for at least 24 hours, dichotomized to any past year quit attempt). The Heaviness of Smoking Index (HSI) was included as a measure of nicotine dependence (Borland, Yong, O'Connor, Hyland, & Thompson, 2010).

Readiness to quit smoking was assessed using the item: “Are you seriously thinking of quitting smoking?” Stage of change was categorized as pre-contemplation (not thinking of quitting in the next 6 months), contemplation (thinking of quitting in the next 6 months), and preparation (thinking of quitting within the next 30 days) (DiClemente, Prochaska, Fairhurst, & Velicer, 1991). Perceived health risks were assessed by adapting work done with adolescents (Halpern-Felsher, Biehl, Kropp, & Rubinstein, 2004). The item was: “Given your current smoking or non-smoking status (that is, the amount you currently smoke), what is the chance (from 0 – 100%) that you will get lung cancer?”

Expired CO was measured using the Bedfont Smokerlyzer CO Monitor (<http://www.bedfont.com/smokerlyzer>). At the end of the RG, 7-day point prevalence abstinence was determined by self-report and expired CO $\leq$ 4 ppm, a stringent cutoff recommended to confirm recent smoking abstinence (Perkins, Karelitz, & Jao, 2013).

Procedures

At the start of each cohort, research staff posted flyers and made announcements to clients about the study. Those interested were directed to a program liaison that checked the time-in-treatment eligibility criterion and then gave a list of interested and eligible participants to the research team. Research team members met with these participants as a group to complete informed consent procedures and baseline measures. After completion of the baseline assessment participants completed the online ES assessment. The general procedure was to collect the CO measure, complete the baseline self-administered survey, and do the online ES assessment. However the CO measure required that participants had not smoked for at least 15 minutes. If a participant arrived immediately after smoking, she was asked to first complete the ES assessment and then complete the CO measure and baseline survey.

Following the three RG sessions, and about 30 days after baseline, participants again completed the online ES assessment, the CO measure, and a follow up survey. Participants were then asked if they were interested in the 4-week smoking cessation group. Those expressing interest were given the time and location of the group, and a binder including cessation group materials. A CONSORT flow diagram (Schulz, Altman, & Moher, 2010) appears in Figure 1.

Smoking Cessation Services

The aim of the RG was to increase readiness to quit smoking, and the outcome was whether participants would initiate smoking cessation services. The study provided a 4 session smoking cessation group based on Hall et al. (Hall et al., 2002), in which participants develop a quit plan, monitor cigarette use and factors that trigger smoking, develop relapse-prevention skills, and maintain commitment to abstinence. The intervention has been shown to increase cessation compared to brief advice and referral (Hall et al., 2002; Hall et al., 2006). Up to 8 weeks of NRT was provided for each participant (Fiore et al., 2008), and cessation groups were led by a psychologist who was not involved in the RG. Both the RG and the cessation group were conducted while participants were in residential treatment. Women who left treatment were contacted for follow up assessments, but could not continue participation in either group.

Analysis Plan

We first compared participants assigned to incentive and control conditions on demographics, treatment characteristics (drug of choice, number of weeks in the treatment program), and smoking behavior (CPD, HSI, past year quit attempt, stage of change). We also compared participants across treatment programs, using the same variables, to identify potential site differences. Because the ES assessment and baseline survey were administered in a different order for some participants, we assessed whether order of administration may have affected key variables at baseline (stage of readiness to quit, perceived risk of lung cancer). We assessed whether RG attendance differed between incentive and control participants. We report the number of participants who made any practice quit attempt and the number who made a successful practice quit attempt during the RG.

Using t-test for continuous and Chi Square for categorical variables, we compared those who did and did not initiate smoking cessation services. Variables associated with initiating smoking cessation services at $p < .10$ were included in simultaneous logistic regression models including age, education, race/ethnicity, condition and number of RG sessions attended, and controlling for nesting within study cohort.

The practice quit attempt was highly correlated with number of RG sessions ($r = 0.47$, $p < .0001$), because preparation for the practice quit attempt occurred in RG session two and success of the quit attempt was assessed in RG session three. Due to this confounding, practice quit attempt could not be entered in the model together with number of RG sessions attended. We explored the association of practice quit attempt with use of cessation services using the same model, but removing number of RG sessions and inserting whether the participant made a successful practice quit attempt. Last, we report 7-day point prevalence abstinence for all participants at the end of the RG, and we report pre-post change in CPD, HSI and stage of change for participants who completed 30 day follow up.

Results

Demographic and Smoking Characteristics

Demographic and smoking measures for the full sample ($n = 75$) are reported in the first column of Table 1.

Comparison by Condition, by Treatment Program, and by Order of Administration

Participants were evenly assigned by cohorts to the control ($n = 36$) and incentive ($n = 39$) conditions. These two groups did not differ significantly on any of the variables listed in Table 1 (data not shown). Across all cohorts, 45 participants were recruited from one residential program and 30 from the other. There were no differences by programs on the variables listed in Table 1 except that participants in one program were more likely to be of Hispanic ethnicity (43.3% v. 20%, Chi Square (3df) = 12.9, $p < .01$). We compared cases receiving the baseline survey first ($n = 44$) to those who received the ES assessment first ($n = 31$) on stage of readiness to quit smoking and perceived risk of lung cancer. There were no significant differences on these variables at baseline. Overall, there were no differences by

condition, no order effects for administration of the baseline and ES assessment, and participants differed by recruitment site on Hispanic ethnicity only.

The Role of Incentives in Readiness Group (RG) Attendance

For Incentive participants ($n = 39$), the amount of incentives received ranged from \$0 to \$40, with a mean of \$21.9 ($SD = \14.76) and a median of \$25. The mean number of RG sessions attended was 2.0 ($SD = 1.11$) for Control and 2.2 ($SD = 1.19$) for Incentive participants ($t(73) = -0.78, p = 0.437$). When compared across conditions using categories to represent the number of RGs attended (0, 1, 2, 3), there was also no difference by condition (Fisher's exact Test: $p = 0.218$).

Practice Quit Attempts

While patient quit attempt efforts were reinforced at 9ppm, for this analysis we defined a successful quit attempt at the standard 8 ppm (SRNT Subcommittee on Biochemical Verification, 2002). Between RG 2 and RG 3, 38 participants made a practice quit attempt. Of those, 19 made a successful practice quit attempt defined as CO 8 ppm at RG 3 (25% of all participants). The remaining 19 participants either registered CO readings 9 ppm ($n = 16$) or were missing the CO reading and were presumed unsuccessful ($n = 3$).

Initiating Smoking Cessation

After the RG, 29 participants (38.7%) achieved the primary outcome of attending at least one session of the smoking cessation group. This proportion did not differ between Incentive (30.8%) and control (44.2%) conditions (Chi Square (1df, $N = 75$) = 2.14, $p = 0.144$). To identify candidate predictors for the multivariate model, we compared each variable in Table 1 for those who did ($n = 29$) and did not attend ($n = 46$) at least one cessation group. Three variables met the $p < .10$ criteria (Table 1). Participants attending the cessation group had been in treatment for more weeks on average (mean = 8.9, $SD = 6.82$) than those not initiating cessation (mean = 5.7, $SD = 6.17, p = .048$). Participants initiating cessation also estimated their chance of contracting lung cancer as higher (66.2%, $SD = 21.3\%$) than those who did not initiate cessation (55.1%, $SD = 28.4\%, p = .061$). Those initiating cessation attended more RGs on average (2.4, $SD = .91$) than those who did not (1.8, $SD = 1.23, p = .018$).

These three variables were entered into a multivariate logistic regression controlling for age, race, education and nesting within cohort, and including condition (Incentive v. Control) as a design feature (Table 2). Model 1 includes the number of RG groups attended (0 to 3) as a predictor, while Model 2 shows making a successful quit attempt as a predictor. In Model 1, having spent more weeks in the treatment program ($OR = 1.08, CI 1.00 - 1.16$) and having a higher perceived risk of lung cancer ($OR = 1.03, CI 1.01 - 1.05$) were modestly associated with attending a smoking cessation group. Attending each RG session was associated with a doubling of the odds that participants would later initiate smoking cessation ($OR = 2.23, CI 1.12 - 4.44$).

Model 2 explores the possible association between the practice quit attempt and later use of smoking cessation services. As in Model 1, having spent more weeks in the treatment

program (OR = 1.10, CI 1.04 – 1.15) and having a higher perceived risk of lung cancer (OR = 1.04, CI 1.03 – 1.05) were modestly associated with attending a smoking cessation group. Making a successful practice quit attempt was also associated with higher odds of attending at least one smoking cessation group (OR = 6.78, CI 2.08 – 22.14).

Changes in Smoking-Related Behavior from Pre to Post Readiness Intervention

Of 75 participants, 61 (81%) completed the 30 day follow up assessment. Of those completing follow up, 4 reported having quit smoking at least 7 days ago and registered expired CO = 4 ppm. Counting all others as smokers, including those lost to follow up, this gives a 5.3% quit rate post RG. Pre-post changes for the 61 participants completing follow up are reported in Table 3. At follow up, 8 women self-reported as non-smokers and so did not answer CPD, HSI, and stage of change items. However these participants did not meet 7-day point prevalence abstinence criteria and were considered as smokers. For these participants we used baseline values of CPD, HSI, and stage of change, a conservative approach to missing data that assumes no change from baseline. For these 61 participants, mean CPD decreased pre- to post-RG (11.8 to 7.6, $t = -6.30$, $df = 60$, $p < .0001$), as did HSI (2.4 to 1.7, $t = -4.63$, $df = 60$, $p < .0001$).

Discussion

The readiness intervention reported here represents the first combined use of the ES and practice quit attempt strategies among smokers enrolled in addiction treatment, and an early use of incentives to support attendance and participation rather than smoking cessation. Of 75 participants, 29 (38.7%) initiated smoking cessation services. Interest in quitting smoking was not a requirement for participation. Half of the participants had made no quit attempt in the past year, at baseline, and one-fourth were not thinking of quitting smoking at all. In this context 38.7% attending smoking cessation groups appears substantial, but we acknowledge that over half of participants did not attend one smoking cessation group.

The hypothesis that incentives for participation in the readiness intervention would yield greater use of smoking cessation services was not supported. The type of incentive (gift cards) was likely appropriate, as \$20 gift cards were valued as reimbursement for research assessments. Incentives supporting RG participation were smaller, however, and may have been too small to be effective. It is also possible that motivation as conceptualized by ES, or quitting rehearsal as conceptualized by the practice quit attempt, are stronger strategies to support use of smoking cessation services. This pilot study offers only one data point within a large literature on motivational incentives. However, based on this study, use of incentives to support participation in readiness groups or similar pre-cessation activities may not be effective, while directly incentivizing smoking reduction or cessation, as in Robles et al. (2005), may hold more promise.

Each additional RG session attended was associated with a doubling of the odds that the participant would later use smoking cessation services. This association was independent of baseline smoking behavior, study condition, and cohort effects. This suggests a dosage effect which, if replicated, would support a relationship between the RG intervention and use of cessation services. Similarly, those making a successful practice quit attempt were

nearly 7 times more likely to use smoking cessation services. This was within a wide confidence interval, however, suggesting the weakness of the estimate or the small sample size. At the end of the RG, in comparison with baseline, participants reported lower CPD and lower tobacco dependence.

Limitations of this pilot study include the absence of a non-RG control condition, which prohibits causal interpretation. A modest sample size restricts ability to observe associations that may exist between baseline variables and use of smoking cessation services, or to observe any differential impact of incentives added to the RG intervention. The inclusion of women only limits generalizability by gender. The intervention was tailored to a residential treatment environment. According to the 2013 National Survey of Substance Abuse Treatment Services (N-SSATS), 9% of all clients in drug abuse treatment services received residential treatment (Substance Abuse and Mental Health Services Administration, 2014). The pilot RG intervention was designed to increase motivation to quit smoking, however the single categorical measure of motivation (readiness to quit smoking) showed no change pre - post RG, possibly because it only assessed three stages rather than providing a continuous measure. Participation in the smoking cessation group offers another measure of motivation and, by this measure, 38.7% of participants were either motivated to quit at the start of the study or their motivation increased during the time of the RG intervention.

Understanding these limitations, the RG intervention offers a model for more effectively addressing smoking in residential drug abuse treatment. The RG was acceptable to participants, demonstrated by a high rate of attendance, and was associated with both initiation of smoking cessation services and with pre-post reductions in smoking behavior.

Acknowledgments

This work was supported by University of California Tobacco Related Disease Research Program (21XT-0088), and by the NIDA San Francisco Treatment Research Center (P50 DA009253). The authors thank leadership, staff and patients of HealthRight 360 who supported this work. Preliminary analyses from this project were included in a poster presentation at the College on Problems of Drug Dependence 2015 Annual Scientific Meeting in Phoenix, AZ.

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Highlights

- We test a 3 session readiness group to help drug treatment clients initiate smoking cessation
- The readiness group was tested both with and without contingent incentives for participation.
- Of 79 readiness group participants, 38% later entered a smoking cessation group
- The proportion that later entered a smoking cessation group did not differ by incentive condition.
- From pre- to post-readiness group, participants also reduced smoking behavior on average

Figure 1.
CONSORT 2010 Flow Diagram

Table 1

Demographic Characteristics for Clients at Baseline (N=75)

	Mean (SD) or n (%) (N = 75)	Attending at least one cessation group (n = 29)	Not attending cessation groups (n = 46)
Age	39.7 (10.29)	40.6 (11.37)	39.2 (9.65)
Education			
Less than HS	14 (18.7%)	4 (13.8%)	10 (21.7%)
High school/GED	28 (37.3%)	10 (34.5%)	18 (39.1%)
More than HS	33 (44.0%)	15 (51.7%)	18 (39.1%)
Race			
Hispanic	22 (29.3%)	7 (24.1%)	15 (32.6%)
Non-Hispanic Black	21 (28.0%)	10 (34.5%)	11 (23.9%)
Non-Hispanic White	22 (29.3%)	9 (31.0%)	13 (28.3%)
Other ¹	10 (13.3%)	3 (10.3%)	7 (15.2%)
Marital Status			
Never Married	20 (28.6%)	11 (40.7%)	9 (20.9%)
Married/Long-term relationship	22 (31.4%)	6 (22.2%)	16 (37.2%)
Separated/Divorced/Widowed	28 (40.0%)	10 (37.0%)	18 (41.9%)
Currently employed	3 (4.1%)	1 (3.5%)	2 (4.4%)
Primary drug used			
Alcohol	18 (24.7%)	9 (31.0%)	9 (20.5%)
Amphetamines/Methamphetamines	32 (43.8%)	11 (37.9%)	21 (47.7%)
Crack/Cocaine	10 (13.7%)	5 (17.2%)	5 (11.4%)
Heroin/Methadone/Opiates	12 (16.4%)	4 (13.8%)	8 (18.2%)
Cannabis	1 (1.4%)		1 (2.3%)
No. of weeks in program	7.0 (6.57)	8.9 (6.82)	5.7 (6.17) *
Cigarettes per day (CPD)	12.3 (5.56)	12.4 (5.44)	12.3 (5.70)
Any quit attempts/past year	39 (52.0%)	18 (62.1%)	21 (45.7%)
Heaviness of Smoking Index (HSI)	2.6 (1.19)	2.6 (1.27)	2.5 (1.15)
Perceived Risk of Lung Cancer	59.5% (26.2%)	66.2% (21.3%)	55.1% (28.4%)
Stage of Change at baseline²			
Contemplation	20 (26.7%)	7 (24.1%)	13 (28.3%)
Preparation	55 (73.3%)	22 (75.9%)	33 (71.7%)
No. Readiness groups attended	2.1 (1.15)	2.4 (0.91)	1.8 (1.23) *
Condition			
Control	36 (48.0%)	17 (58.6%)	19 (41.3%)
Incentive	39 (52.0%)	12 (41.4%)	27 (58.7%)

¹ Includes Non-Hispanic Asian, Native Hawaiian/Pacific Islander, Native American/Alaskan, mixed race, and other.

² No participants were in the precontemplation stage at baseline.

* P-values are significant, p<0.05

Table 2

Predictors of Attending at Least One Smoking Cessation Group (N = 75) *

	Model 1 [†]			Model 2 [‡]		
	Adjusted OR (95% CI)	Wald Chi-square, df	p	Adjusted OR (95% CI)	Wald Chi-square, df	p
Number of weeks in tx. program	1.08 (1.00–1.16)	4.28, 1	0.038	1.10 (1.04–1.15)	13.40, 1	<0.001
Risk perception of lung cancer	1.03 (1.01–1.05)	9.12, 1	0.003	1.04 (1.03–1.05)	31.25, 1	<0.001
Condition						
Control	1					
Incentive	0.47 (0.08–2.78)	0.71, 1	0.403	0.41 (0.07–2.45)	0.96, 1	0.327
No. of readiness groups attended	2.23 (1.12–4.44)	5.24, 1	0.022			
Successful practice quit attempt (PQA)				6.78 (2.08–22.14)	10.05, 1	0.002

* Multivariate logistic regression was built from all significant variables from univariate analysis (at p value 0.10) including number of weeks in the program, perception of risk of lung cancer, and number of readiness groups attended or making a successful practice quit attempt. Models controlled for age, race, and education. Models also controlled for nesting participants within cohort.

[†] Number of Readiness Groups attended is inter-correlated with making a successful practice quit attempt. Model 1 includes Number of Readiness Groups attended, while Model 2 includes making a successful practice quit attempt.

Table 3

Pre- and Post-Readiness Group Changes (N = 61)

Variable	Pre-intervention	Post-intervention	p value ¹
Perceived risk of lung cancer	64.7% (25.14%)	60.3% (25.26%)	0.211
CPD ²	11.8 (5.48)	7.6 (5.19)	<0.0001
HSI ^{2,3}	2.4 (1.17)	1.7 (1.20)	<0.0001
Stage of change ²			0.359
Pre-contemplation		2 (3.3%)	
Contemplation	15 (25.0%)	12 (20.0%)	
Preparation	45 (75.0%)	42 (70.0%)	
Action		4 (6.7%)	

¹ Applied paired-t test for continuous variables and sign test for categorical variables for pre- and post-intervention comparison.

² 8 women self-reported as non-smokers and so did not answer CPD, HSI, and stage of change items at follow-up. However these participants did not meet 7-day point prevalence abstinence criteria and were considered as smokers. For these participants we used baseline values of CPD, HSI, and stage of change as follow-up data.

³ Heaviness of Smoking Index