

Acceptance and Commitment Therapy for Smoking Cessation: A Preliminary Study of Its Effectiveness in Comparison With Cognitive Behavioral Therapy

Mónica Hernández-López and M. Carmen Luciano
Universidad de Almería, Spain

Jonathan B. Bricker
Fred Hutchinson Cancer Research Center and University of
Washington

Jesús G. Roales-Nieto
Universidad de Almería, Spain

Francisco Montesinos
Asociación Española Contra el Cáncer, Spain

This controlled preliminary trial determined the feasibility and initial effectiveness of a promising behavioral intervention for smoking: Acceptance and Commitment Therapy (ACT). In a quasi-experimental design, the ACT intervention condition used metaphors and experiential exercises focused on personal values to motivate quitting smoking and enhancing the willingness to experience internal cues to smoke (e.g., urges) and abstinence-related internal distress. The comparison condition was cognitive behavioral therapy (CBT)—the current standard in behavioral intervention for smoking cessation. Each treatment was delivered in seven weekly 90-min sessions in a group format to 81 (43 in ACT; 38 in CBT) adult smokers. Results show that the ACT treatment was as feasible as the CBT treatment. They also demonstrate promising evidence of ACT's effectiveness: 30.2% intent-to-treat biochemically-supported 30-day point prevalence at twelve month follow-up, compared with 13.2% in the CBT condition (odds ratio = 5.13; $p = .02$). Replication in a well-powered, randomized, controlled trial is now needed.

Keywords: smoking cessation, acceptance and commitment therapy, cognitive behavioral therapy, effectiveness

Publication of the first report on the damaging effects of smoking (U.S. Public Health Service, 1964) stimulated a broad development of behavioral smoking cessation interventions, with many achieving considerable effectiveness (Schwartz, 1987). However, since the late 1980s, innovations in behavioral interventions for cessation have dwindled (Niaura & Abrams, 2002; Shiffman, 1993).

Currently, the most commonly used behavioral intervention is Cognitive Behavioral Therapy (CBT). CBT focuses on teaching

skills in coping with both *internal* (e.g., cravings) and *external* cues to smoke (e.g., seeing other smokers). Both theory and research support the notion that emotions, thoughts, and physical sensations like craving and withdrawal are potent internal cues to smoke (Balfour & Ridley, 2000; Shiffman et al., 2002; Shiffman & Waters, 2004). Moreover, external cues are believed to lead to smoking by inducing internal cues such as cravings (Baer & Lichtenstein, 1988; Otto, Powers, & Fischmann, 2005; Perkins, Conklin, & Levine, 2007). A key strategy by which CBT addresses internal cues to smoke is to help smokers *reduce* or *avoid* these cues (Fiore et al., 2000, 2008; Perkins et al., 2007). U.S. Public Health Service clinical practice guidelines recommend multicomponent CBT programs, alone or in combination with pharmacotherapy, as the choice psychological treatment (Fiore et al., 2000, 2008). However, leaders in the field have called for innovations in behavioral smoking cessation interventions (Niaura & Abrams, 2002; Shiffman, 1993), because treatment abstinence rates seem stagnant or even declining in the last years (Irvin & Brandon, 2000).

A recent innovation in behavior therapy is Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999). To date, ACT has shown promise for the treatment of a variety of psychological disorders, including psychoses, anxiety and stress, depression, substance abuse, and chronic pain (for a recent review, see Hayes, Luoma, Bond, Masuda, & Lillis, 2006). From the ACT perspective, all these apparently different disorders functionally share a common feature: the individual's attempts to control or

Mónica Hernández-López, M. Carmen Luciano, and Jesús G. Roales-Nieto, Departamento de Personalidad, Evaluación y Tratamiento Psicológicos, Universidad de Almería, Almería, Spain; Jonathan B. Bricker, Fred Hutchinson Cancer Research Center, Seattle, WA; Department of Psychology, University of Washington, Seattle, Washington; Francisco Montesinos, Asociación Española Contra el Cáncer, Madrid, Spain.

The data presented in this study are part of Mónica Hernández-López's clinical psychology doctoral dissertation at the University of Almería under the supervision of the second and fourth authors. This research was supported by a faculty development grant from Junta de Andalucía. The research was conducted in collaboration with the Spanish Association Against Cancer (Asociación Española Contra el Cáncer). The first author expresses her appreciation to Miguel Rodríguez Valverde for his help in the preparation of this manuscript. A copy of the full treatment protocols is available upon request to the first author.

Correspondence concerning this article should be addressed to Mónica Hernández-López, Departamento de Psicología, Facultad de Humanidades y Ciencias de la Educación, Universidad de Jaén, Campus las Lagunillas s/n, 23071-Jaén, Spain. E-mail: mhlopez@ujaen.es

reduce private aversive events (e.g., delusions, anxiety, sadness, cravings, pain). Although in the short run these control attempts may work, in the long run they may result in an exacerbation of those unwanted private events and in a reduced ability to take actions in important areas of life (e.g., to quit smoking). This phenomenon has been termed experiential avoidance (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996; Luciano & Hayes, 2001).

ACT is designed to help individuals stop attempting to control or avoid unpleasant sensations or emotions (e.g., craving and withdrawal), and instead allow the things that are deeply important to them guide their behavior. The goal of ACT is not to *lessen* unpleasant sensations, emotions, and thoughts, but rather to increase willingness and openness to experience them. Willingness to experience these private events and to respond with *acceptance* rather than escape facilitates individuals' *commitment* to behaviors guided by their core values (Hayes, Strosahl, & Wilson, 1999; Luciano, Rodríguez, & Gutiérrez, 2004).

To date, there is only one published trial of ACT for smoking cessation (Gifford et al., 2004), which was compared with Nicotine Replacement Therapy (NRT). In a randomized, controlled trial of 76 adult smokers, the ACT intervention was seven individual and seven group weekly sessions while the NRT intervention included an initial group education meeting and seven weekly contacts with a physician who provided the nicotine patches. In intent-to-treat analyses, the ACT condition had a 21% 24-hr biochemically supported point prevalence abstinence at the twelve-month follow up versus 9% for the NRT control arm (odds ratio [OR] = 2.62; $p = .15$). In addition, in a recent study ACT showed promise for improving distress tolerance in a single group of 16 early lapse nicotine dependent smokers (Brown et al., 2008).

To build on the current evidence base of ACT for smoking cessation, several advances are needed. First, there is a need for a behavioral treatment control condition, as the Gifford et al. study makes it difficult to conclude whether outcomes were attributable to the presence of a behavioral treatment or to ACT specifically (Brown et al., 2008). The choice of a behavioral treatment control condition that is the *current standard* would be highly valuable in order to learn whether ACT is a significant advance. Second, there is a need to determine whether ACT will be useful in a less intensive and more cost-effective format (e.g., group treatment only). Third, there is a need for a longer abstinence measure, readily comparable with results from other behavioral intervention trials (e.g., 30-day point prevalence; Lancaster & Stead, 2005; Stead & Lancaster, 2005; Stead, Perera, & Lancaster, 2006). To address these needs, this preliminary study, following the intent-to-treat principle, examined the effectiveness of ACT in comparison with CBT. The main study aims were to determine the (1) feasibility and participant acceptability of delivering ACT for smoking cessation in a seven-session weekly group format and (2) effectiveness of this ACT intervention in which the outcome was the 30-day biochemically-supported point prevalence at 12 months after the end of treatment.

Method

Eligibility Criteria and Participants

To participate in the study, each candidate had to: (a) have smoked for at least the past 5 years, (b) be currently smoking

at least 10 cigarettes a day, (c) be at least 18 years old, (d) not have any current major psychological disorders, (e) not be using any other smoking cessation treatment (e.g., nicotine patch), and (f) be willing to attend treatment and follow-up sessions, complete surveys and expired CO tests, and session audiotaping.

The sample was 52 women (64%) and 29 men (36%), with ages ranging from 25 to 68 years old ($M = 42.43$; $SD = 9.44$). The average number of cigarettes smoked per day was 23.9 ($SD = 9.30$), and the mean score on the Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991) was 5.68 ($SD = 2.67$). Most participants (58%) had smoked for more than 20 years. Most (54.3%) had tried to quit once or twice, while a considerable 40.8% had tried to quit three or more times.

Measures

Demographic information was collected, along with the following smoking-related factors empirically known to predict smoking cessation relapse (Chabrol, Niezborala, Chastan, Montastruc, & Mullet, 2003; Hajek, Stead, West, Jarvis, & Lancaster, 2005).

Smoking-Related Information

(1) Smoking history, (2) previous quit attempts, (3) reasons for relapse, (4) situations and reinforcers which maintain smoking, (5) motivation to quit, (6) reasons for quitting, (7) barriers to quit, (8) symptoms or diseases related to smoking, (9) expectations about treatment, (10) daily contact with smokers, (11) health-related habits, (12) Fagerström Test for Nicotine Dependence (FTND; Heatherton et al., 1991), (13) Pretreatment Confidence Questionnaire (PCQ; Condiotte & Lichtenstein, 1981).

Acceptance and Action Questionnaire (AAQ; Hayes et al., 1999)

Participants also completed a nine-item AAQ, the most widely used measure of experiential avoidance. We speculated that, for some people, smoking may serve to help them avoid their thoughts and feelings. Such an avoidant tendency might interfere with the process of quitting smoking. The AAQ, with a score range from 9 (*lowest avoidance*) to 63 (*highest avoidance*), shows moderate reliability and validity (Barraca, 2004; Hayes et al., 2004). This is the first smoking cessation study, to our knowledge, to include this measure.

Abstinence Status

Expired Carbon Monoxide (CO)

Measured using a Bedfont Micro Smokerlyzer CO monitor (Bedfont Technical Instruments Ltd, Sittingbourne, Kent, United Kingdom), CO levels of 5 parts per million (ppm) were used to support self-reports of smoking cessation. While expired CO has a short half-life, it is the most-often used biochemical measure that provides easy, non-invasive, and immediate support of self-reported abstinence (Middleton & Morice, 2000).

Primary Endpoint: Point Prevalence

The point prevalence was the primary outcome measure because: (1) it is the most common cessation outcome (Keely, Hughes, & Carpenter, 2001), making it readily comparable with other behavioral intervention trials (Lancaster & Stead, 2005; Stead & Lancaster, 2005; Stead, Perera, & Lancaster, 2006); (2) it provides a high level of statistical power (Hughes et al., 2003), making it ideal for a smaller pilot study; (3) it provides unbiased estimate of the rate of prolonged abstinence (Stead, Perera, Bullen, Mant, & Lancaster, 2008); (4) may serve to capture those who quit later in the process (Velicer, Prochaska, Rossi, & Snow, 1992); and (5) the U.S. Public Health Service now uses point prevalence as the preferred outcome (Fiore et al., 2008). According to Velicer and colleagues (Velicer et al., 1992), point prevalence was defined as self-reported abstinence (i.e., not even a puff) of: (1) 24 hrs at the end of treatment, (2) 7 days at 3 and 6 months, posttreatment, and (3) 30 days at 12 months' posttreatment. In all cases, these reports had to be corroborated by a expired CO measure of 5 ppm or less. All missing cases at any of the follow up points were considered nonabstinent.

Secondary Endpoint: Prolonged Abstinence

To provide a more longitudinal perspective of the outcome, such that a participant's course during the follow-up period may be captured, as a secondary outcome we examined a participant's prolonged abstinence (as defined by Hughes et al., 2003) over the periods of both 6 and 12 months' posttreatment.

Quasi-Experimental Design

The ACT treatment was compared with a well-established CBT treatment. Participants who initially responded to the study by contacting the Spanish Association Against Cancer (SAAC) received CBT, while those who responded to the study by contacting the University of Almería received ACT.¹

Recruitment, Screening, Eligibility, and Enrollment

Participant recruitment was carried out in Almería, Spain (population 190,000). The participants in the CBT condition were recruited through usual procedures employed by the SAAC: advertisements with contact information for the local SAAC psychology service, at their Almería branch and in local newspapers. The recruitment of participants in the ACT condition was carried out similarly: advertisements with contact information for the University of Almería psychology research service, at the Almería city hall, local branches of a nationwide savings bank, and the local branch of a nationwide chain of department stores. For both conditions, the study advertisements included the same information about the possibility of receiving smoking cessation treatment free of charge. This recruitment procedure was necessary because SAAC regulations stated that their treatment program would be applied to all individuals requesting service from them, and not to individuals recruited from an outside source (e.g., randomly assigned from the University of Almería).

After a brief phone screening, potential participants were scheduled for an informative session in which they were informed that the interventions would be part of a research program and in-

formed consent was requested. They completed demographic as well as all baseline measures, and were individually scheduled for a session of personal interview that served for the final determination of participant eligibility according to the inclusion criteria. All procedures were approved by the University of Almería Ethics Board of Human Subjects Research. See the diagram of screening, eligibility, allocation, and follow-up in Figure 1.

Interventions: Protocols, Providers, and Treatment Structure

The ACT treatment protocol was an adaptation of ACT to smoking cessation based on two manuals (Hayes et al., 1999; Wilson & Luciano, 2002). The CBT protocol was the standard manualized cessation program provided in SAAC branches throughout Spain (Asociación Española Contra el Cáncer, 2000), which followed PHS clinical guidelines (Fiore et al., 2000).

The ACT intervention was administered by the first author, an ACT-trained clinical psychology doctoral student, under the supervision of the second author. The CBT intervention was administered by a licensed clinical psychologist (fifth author) working in the SAAC Almería branch delivering this smoking cessation treatment for 8 years.

The intervention structures were matched on a number of key parameters: (1) each treatment was delivered in seven weekly 90-min group sessions; (2) in groups consisting of 8 to 10 smokers each; (3) the session structure was similar for both treatments: assessment of cigarette consumption and review of treatment exercise homework, introduction and group practice of specific therapeutic elements, and setting goals and homework for the next week.

ACT Intervention

Several metaphors, paradoxes, examples, and experiential exercises, most of them drawn from Hayes et al. (1999) and from Wilson & Luciano (2002), were used with the aim of clarifying the value of quitting and of promoting the willingness and acceptance of thoughts, emotions, and sensations related to quitting.

(a) *Analyzing the personal cost of smoking as an attempt to control private events.* The first step was to make participants aware of the personal cost of smoking. For most of them smoking was a control strategy that in the short run served to reduce anxiety, urges, or distress, although it was ineffective long-term. The therapist illustrated how trying to control thoughts, emotions, and sensations might not only be futile, but more importantly, have negative effects on certain valued life domains (e.g., health, family).

(b) *Values clarification and commitment with personal choices.* The therapist helped participants clarify their values and examine how quitting fits into a more meaningful life. They were taught to identify and undertake specific actions oriented to quit (e.g.,

¹ SAAC is a major nonprofit organization with branches throughout Spain. SAAC provides prevention services to the general population (e.g., early detection and diagnosis, prevention programs, smoking cessation treatment). Its smoking cessation treatment is a well-established manualized CBT intervention that has been provided for over 20 years.

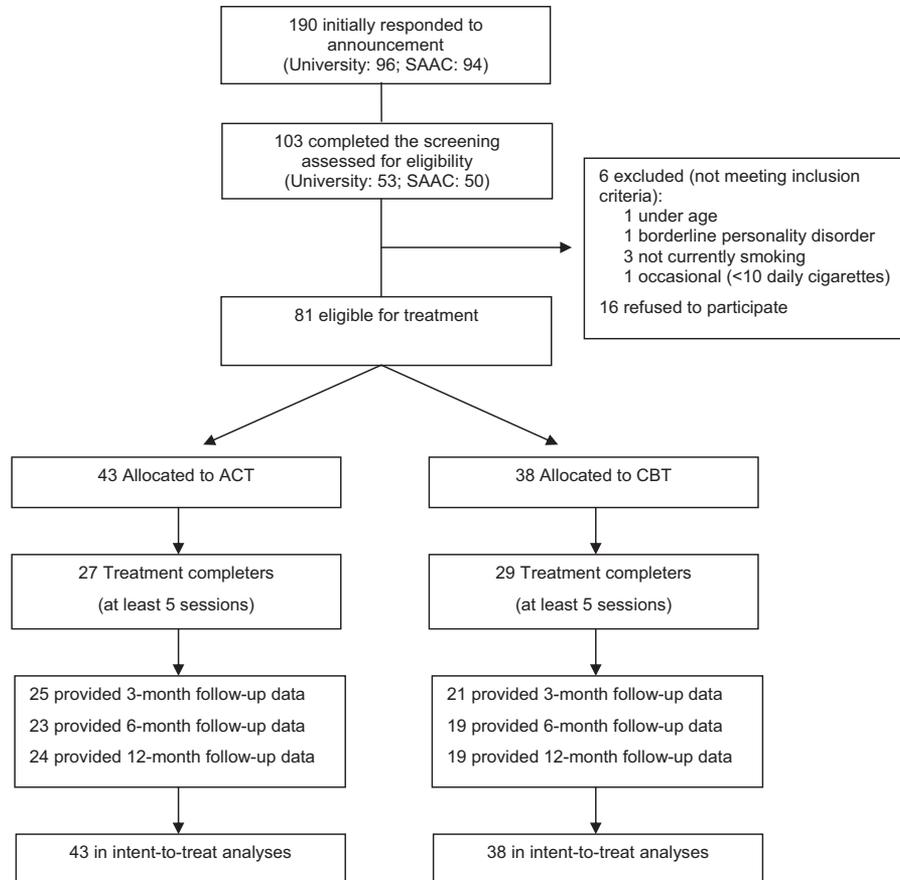


Figure 1. Consort diagram of the screening, eligibility, allocation, and follow-up of study participants.

choosing how to quit, either gradually reducing their cigarette consumption in one third each week, or “cold turkey,” by setting a date for quit) and to detect psychological barriers (e.g., fear of withdrawal) to these actions. They were encouraged to commit to taking valued actions.

(c) *Defusion and willingness to experience and accept private aversive events.* Participants were trained to detect which internal and external triggers led them to smoking, and to differentiate among those they could change (e.g., throwing away ashtrays) and those they could not (e.g., being sad) or did not want to change because of the personal cost it would imply (e.g., by refusing to meet with friends who smoke you’ll probably have less urges, but you will lose their companion). The goal was to break the link between triggers and smoking behavior. They were taught to see thoughts as thoughts, not as the cause of smoking. They also learned to see themselves as the context in which urges and withdrawal symptoms occur, and were encouraged to actively expose themselves to their private aversive events.

(d) *Relapse as part of the process of quitting.* No explicit difference was made between lapse and relapse. Participants were trained to “notice when they were detouring from the direction they wanted to follow,” and then to “get back to that direction” regardless of the intensity of lapse (i.e., whether they had smoked a puff, a cigarette, or resumed smoking for some time).

CBT Intervention

The intervention was structured in three interrelated phases: preparation to quit, quitting, and maintenance of cessation/relapse prevention.

(a) *Preparation phase.* The aim was to increase the smokers’ motivation and to provide them with strategies to facilitate quitting. Each participant had to deposit 60 Euros before treatment. This was fully returned upon attendance to all seven treatment sessions, with one-third lost for each missed session, and all of it lost for three missed sessions. In addition, participants received medical information about the health consequences of smoking, and each of them assessed their pros and cons for quitting vs. smoking in order to facilitate the decision to quit. They also learned to self-monitor their triggers and smoking behavior, so that they became aware of how smoking was linked to certain thoughts and feelings.

(b) *Quit phase.* The main element was nicotine fading. Each week after the second session smokers had to reduce their cigarette consumption in one third, so that between the fourth and fifth session they should have quit. They were told that this gradual reduction would involve less distress, and were encouraged to use self-reinforcement for goal achievement. Nicotine fading was sup-

ported with psychoeducation about smoking behavior maintenance and about the role of anxiety and stress in smoking. Participants received training in coping strategies aimed to avoiding external triggers and to controlling or minimizing internal triggers, such as abdominal breathing, thought stopping, cognitive restructuring, and distraction.

(c) *Maintenance of abstinence phase.* Relapse prevention was addressed by providing information about the Abstinence Violation Effect (Marlatt & Gordon, 1985), by further training in coping with triggers to smoke, and also by training in problem-solving skills in order to facilitate coping with ordinary life problems.

Therapist Adherence to Treatment Protocols

Two trained graduate students independently rated a 25% random sample of audiotaped sessions from each treatment condition for therapists' adherence to their respective treatment protocol. Raters coded, with yes or no responses, whether the specific overall goals and whether the specific therapy techniques for each session were covered. Each session was deemed adherent to its respective protocol if 100% of the stated goals and 90% of the specific techniques were covered. Inter-observer agreement was 95.16% [κ (w) = 1.000] for the CBT condition and 95.79% [κ (w) = 1.000] for the ACT condition. Following these criteria, 100% of the sessions in both conditions were rated as adherent.

Data Analysis Plan

Using SPSS 15.0, demographic variables, baseline scores on empirically-supported predictors of smoking cessation and the AAQ, as well as treatment feasibility and acceptability, were compared between conditions. For categorical variables, χ^2 tests were calculated. Two-tailed t tests were calculated for quantitative variables demonstrating normality and homoscedasticity while Mann-Whitney U tests were calculated for those not. Using SAS 9.1, ACT treatment effectiveness was calculated with a logistic regression in which a binary indicator of condition (ACT vs. CBT) was the predictor variable and a binary indicator of point prevalence was the outcome variable. Separate logistic regression equations were calculated, with appropriate point-prevalence outcome indicator variables, at (1) end of treatment, (2) three, (3) six, and (4) 12 months post treatment. All equations were recalculated among those who completed at least five sessions. To correct for potential biases because of differences between the two treatment conditions, all regression analyses included as covariates the baseline scores on empirically-supported predictors of smoking cessation that significantly differed between the two conditions. Since we speculated that an avoidant coping tendency might interfere with the process of quitting, we accounted for the AAQ's baseline group differences in a secondary adjusted regression analysis even though the AAQ is not an empirically supported predictor of cessation. Finally, unadjusted regression analyses were also conducted for descriptive purposes. Analyses followed the intent-to-treat principle (Lachin, 2000). Results are reported as odds ratios and their associated two-sided p values.

Results

Smoking-Related and Demographic Variables

Baseline scores on the following empirically-supported predictors of smoking cessation relapse significantly differed between ACT and CBT participants: (1) *Stage of Change* (desire to quit in next 30 days: 67.4% for ACT vs. 84.2% for CBT; more than 30 days but within the next 6 months: 4.7% for ACT vs. 7.9% for CBT; doesn't know: 27.9% for ACT vs. 5.3% for CBT; $\chi^2 = 7.08$; $p = .03$); (2) *Smokes at parties* (81.4% for ACT vs. 50.0% for CBT; $\chi^2 = 9.30$; $p = .002$); (3) *Smokes for pleasure* (69.8% for ACT vs. 34.2% for CBT; $\chi^2 = 10.45$; $p = .001$); (4) *Smokes out of habit* (67.4% for ACT vs. 39.5% for CBT; $\chi^2 = 6.48$; $p = .01$); (5) *Drinks alcohol* (i.e., usually drinks at least two beers or glasses of wine or one glass of liquor per week; 41.9% for ACT vs. 13.2% for CBT; $\chi^2 = 8.174$; $p = .004$); (6) *Positive expectations about improving in treatment* (ACT participants had more positive expectations: $M = 4.29$ for ACT vs. $M = 3.08$ for CBT; $U = 460.0$; $p = .002$).

Besides, ACT participants were younger ($M = 39.40$ years for ACT vs. $M = 45.87$ years for CBT; $t = 3.26$; $p = .002$) and they reported slightly less avoidant coping (AAQ's $M = 36.26$ for ACT vs. $M = 39.06$ for CBT; $t = 2.22$; $p = .03$). All other demographic variables and baseline scores on empirically-supported predictors of smoking cessation did not significantly differ (i.e., all $p > .05$) between conditions.

Treatment Attendance Rates

The mean number of attended sessions was 4.95 ($SD = 1.72$) for ACT and 5.42 ($SD = 1.78$) for CBT ($U = 682.5$; $p = .19$). Fifty-six participants out of the 81 (69.1%) enrolled study participants attended at least five of the seven treatment sessions (our definition of completing treatment). In the ACT condition, 27 participants (62.8%) completed treatment compared with 29 (76.3%) in the CBT condition ($\chi^2 = 1.72$; $p = .19$).

Smoking Status Outcome Measure Completion Rates

The percentage (and number) of participants completing both a self-reported and expired CO smoking outcome measure were the following: 69.8% ($n = 30$) for ACT compared with 73.7% ($n = 28$) for CBT at end of treatment ($\chi^2 = .152$; $p = .70$), 58.13% ($n = 25$) for ACT compared with 55.3% ($n = 21$) for CBT at 3 months' follow-up ($\chi^2 = .068$; $p = .79$), 53.5% ($n = 23$) for ACT as compared with 50.0% ($n = 19$) for CBT at 6 months' follow-up ($\chi^2 = .098$; $p = .75$), 55.8% ($n = 24$) for ACT compared with 47.4% ($n = 19$) for CBT at 12 months' follow-up ($\chi^2 = .576$; $p = .45$).

Treatment Acceptability and Adherence

Treatment acceptability and adherence were reported at post treatment ($n = 48$; ACT, $n = 24$; CBT, $n = 24$). For ACT, (a) 91.7% of participants reported that the treatment was useful compared with 79.2% for CBT ($\chi^2 = 1.505$; $p = .220$), (b) 70.9% were satisfied with the treatment compared with 86.4% for CBT ($\chi^2 = 1.785$; $p = .618$), and (c) 87.5% regularly practiced treatment techniques compared with 65.2% for CBT ($\chi^2 = 3.253$; $p = .071$).

Intervention Effectiveness on Smoking Status

Primary Aim Outcome Results

Table 1 shows intent-to-treat point-prevalence abstinence results. For all enrolled study participants, the abstinence rates at 12-month follow-up were 30.2% for ACT compared to 13.2% for CBT. Results from the adjusted logistic regression analyses indicated that participants in the ACT condition had a 5.13 times higher odds ($p = .02$) of abstinence compared with CBT. When AAQ scores were adjusted for in the analysis, the results were similar (12 month follow-up: OR = 4.18; $p = .05$). The abstinence rates for treatment completers also favored ACT participants, with 48.1% for ACT compared with 17.2% for CBT at the 12-month follow-up. Results from the adjusted logistic regression analyses indicated that completers in the ACT condition had 9.69 times higher odds ($p = .003$) of abstinence compared with CBT. When AAQ scores were adjusted for in the analysis, the results were similar (12-month follow-up: OR = 6.74; $p = .02$).

Secondary Aim Outcome Results

Regarding prolonged abstinence for all participants, the ACT condition had a 3.78 times higher adjusted odds ($p = .05$) of 6 months prolonged abstinence (27.9% abstinence rate) compared with the CBT condition (13.2% abstinence rate; OR = 2.55, $p = .10$ for unadjusted). Results for 12 months' prolonged abstinence showed a similar but nonsignificant trend: ACT (25.6%) versus CBT (13.2%; OR = 3.40, $p = .09$ for adjusted; OR = 2.27, $p = .16$ for unadjusted). For treatment completers, the ACT condition had a 7.11 times higher adjusted odds ($p = .01$) of 6 months' prolonged abstinence (44.4% abstinence rate) compared with the CBT condition (17.2% abstinence rate; OR = 3.84; $p = .03$ for unadjusted). Results for 12 months' prolonged abstinence were similar: ACT (40.7%) versus CBT (17.2%; OR = 6.01, $p = .03$ for adjusted; OR = 3.30, $p = .05$ for unadjusted).

Discussion

Feasibility and acceptability results showed that for the ACT condition, participants: (1) attended most of the sessions, (2) found the treatment useful, (3) were satisfied with the treatment, and (4)

regularly practiced ACT treatment techniques. These results did not differ in comparison with the CBT condition. Overall, the ACT intervention appeared feasible and acceptable to the participants. ACT treatment effectiveness results were also promising. Participants in the ACT condition had a 5.13 times higher odds of abstinence compared with the CBT condition at the longest term follow-up point. Results were even stronger among participants who completed at least five treatment sessions. The observed 30% 30-day point prevalence abstinence rate at the 12 month follow-up is about twice as high as the 15.9% weighted average of the 30-day abstinence 12 month follow-up outcomes reported in group behavioral interventions for smoking cessation (Stead & Lancaster, 2005) and is an improvement over the 21% intent-to-treat 24-hr abstinence rate of the Gifford et al. (2004) study.

This preliminary study's small sample size gave it limited statistical power. The study had a quasi-experimental design, which is commonly used in behavioral interventions for smoking cessation (Sussman, Sun, & Dent, 2006) and which provided a real-world CBT comparison. However, this type of design often yields potentially biasing baseline differences between the intervention and control conditions. We addressed this limitation in these ways: (1) similar recruitment procedures in both conditions; (2) the study advertisements included the same information about the possibility of receiving smoking cessation treatment free of charge; (3) we compared the two conditions on important baseline characteristics empirically known to predict smoking cessation relapse; and (4) we controlled for this differences between conditions. Moreover, there were no significant baseline differences (all $p > .05$) on factors potentially pertinent to recruitment from a cancer prevention organization versus a university-based psychological service (e.g., depression, reasons for quitting, diseases related to smoking), and no participant had cancer. However, it is possible that unmeasured differences between conditions affected the cessation outcomes. Thus, in light of this limitation, we recommend, as an important next step for building the evidence base of ACT for smoking cessation, that a randomized, controlled trial comparing ACT with CBT be conducted. Such a study would also need to collect data on key baseline variables and adjust for any differences since even rigorous randomized controlled trials can reveal baseline imbalances (e.g., see Liu et al., 2007). It would also

Table 1

Comparison of Acceptance and Commitment Therapy (ACT) With Cognitive Behavioral Therapy (CBT) on Posttreatment, 3, 6, and 12 Month Point Prevalence Abstinence Rates and Their Associated Odds Ratios and p Values

Follow-up endpoint	ACT	CBT	Unadjusted odds ratio	p	Adjusted odds ratio ^a	p
All participants ($n = 81$)						
Posttreatment	41.9% (18/43)	23.7% (9/38)	2.32	.08	2.44	.16
3 months	37.2% (16/43)	18.4% (7/38)	2.62	.06	3.35	.17
6 months	27.9% (12/43)	15.8% (6/38)	2.06	.19	2.51	.18
12 months	30.2% (13/43)	13.2% (5/38)	2.86	.06	5.13	.02
Treatment completers ($n = 56$)						
Posttreatment	66.7% (18/27)	31.0% (9/29)	4.44	.01	9.23	.01
3 months	59.3% (16/27)	24.1% (7/29)	4.57	.01	9.63	.01
6 months	44.4% (12/27)	20.7% (6/29)	3.07	.06	4.90	.04
12 months	48.1% (13/27)	17.2% (5/29)	4.46	.01	9.69	.003

^a Adjusted for baseline significant differences in: (1) stage of change, (2) smoking at parties, (3) smoking for pleasure, (4) smoking out of habit, (5) alcohol use, and (6) expectations about treatment.

require multiple therapists in each condition in order to control for potential therapist effects. Finally, future trials should test whether ACT for smoking cessation is mediated by its theory-based processes.

Nevertheless, the study also provides a number of key advances over the current evidence base of ACT for smoking cessation (Brown et al., 2008; Gifford et al., 2004). Specifically, the study: (1) was the first study to suggest that ACT is effective for smoking cessation in an intent-to-treat analysis; (2) compared ACT for smoking cessation with the current standard in behavioral intervention (i.e., CBT); (3) delivered ACT in a less intensive and more brief format (e.g., group treatment only), thereby making it a more cost-effective intervention program; (4) used a biochemically-supported measure of abstinence that can be readily compared with other behavioral intervention trials (e.g., Stead & Lancaster, 2005).

Overall, this study suggests that ACT for smoking cessation is feasible and demonstrates promising effectiveness in comparison with CBT. Replication in a well-powered randomized controlled trial is now needed.

References

- Asociación Española Contra el Cáncer. (2000). *Programa terapéutico para dejar de fumar* [A therapeutic program for smoking cessation]. Unpublished handbook.
- Baer, J. S., & Lichtenstein, E. (1988). Classification and prediction of smoking relapse episodes: An exploration of individual differences. *Journal of Consulting and Clinical Psychology, 56*, 104–110.
- Balfour, D. J., & Ridley, D. L. (2000). The effects of nicotine on neural pathways implicated in depression: A factor in nicotine addiction? *Pharmacology, Biochemistry & Behavior, 66*, 79–85.
- Barraca, J. (2004). Spanish adaptation of the acceptance and action questionnaire (AAQ). *International Journal of Psychology and Psychological Therapy, 4*, 505–515.
- Brown, R. A., Palm, K. M., Strong, D. R., Lejuez, C. W., Kahler, C. W., Zvolensky, M. J., et al. (2008). Distress tolerance treatment for early-lapse smokers: Rationale, program description, and preliminary findings. *Behavior Modification, 32*, 302–332.
- Chabrol, H., Niezborala, M., Chastan, E., Montastruc, J., & Mullet, E. (2003). A study of the psychometric properties of the Fagerström test for nicotine dependence. *Addictive Behaviors, 28*, 1441–1445.
- Conditte, M. M., & Lichtenstein, E. (1981). Self-efficacy and relapse in smoking cessation programs. *Journal of Consulting and Clinical Psychology, 49*, 648–658.
- Fiore, M. C., Bailey, W. C., Cohen, S. J., Dorfman, S. F., Goldstein, M. G., Gritz, E. R., et al. (2000). *Treating tobacco use and dependence. Clinical practice guidelines*. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service.
- Fiore, M. C., Jaén, C. R., Baker, T. B., Bailey, W. C., Benowitz, N. L., Curry, S. J., et al. (2008). *Treating tobacco use and dependence: 2008 update-clinical practice guideline*. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service.
- Gifford, E. V., Kohlenberg, B. S., Hayes, S. C., Antonuccio, D. O., Piasecki, M. M., Rasmussen-Hall, M. L., et al. (2004). Acceptance-based treatment for smoking cessation. *Behavior Therapy, 35*, 689–705.
- Hajek, P., Stead, L. F., West, R., Jarvis, M., & Lancaster, T. (2005). Relapse prevention interventions for smoking cessation. *Cochrane Database of Systematic Reviews, 1*, CD003999.
- Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and Commitment Therapy: Model, processes and outcomes. *Behavior Research & Therapy, 44*, 1–25.
- Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and Commitment Therapy: An experiential approach to behavior change*. New York: Guilford Press.
- Hayes, S. C., Strosahl, K. D., Wilson, K. G., Bissett, R. T., Pistorello, J., Toarmino, D., et al. (2004). Measuring experiential avoidance: A preliminary test of a working model. *The Psychological Record, 54*, 553–578.
- Hayes, S. C., Wilson, K. G., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Experiential avoidance and behavioral disorders: A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology, 64*, 1152–1168.
- Heatherston, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerström, K. O. (1991). The Fagerström test for nicotine dependence: A revision of the Fagerström tolerance questionnaire. *British Journal of Addiction, 86*, 1119–1127.
- Hughes, J. R., Keeky, J. P., Niaura, R. S., Ossip-Klein, D. J., Richmond, R. L., & Swan, G. E. (2003). Measures of abstinence in clinical trials: Issues and recommendations. *Nicotine & Tobacco Research, 5*, 13–25.
- Irvin, J. E., & Brandon, T. E. (2000). The increasing recalcitrance of smokers in clinical trials. *Nicotine & Tobacco Research, 5*, 27–35.
- Keely, J. P., Hughes, J. R., & Carpenter, M. J. (2001). A method to convert prolonged abstinence and point prevalence quit rates. *Nicotine & Tobacco Research, 3*, 272–273.
- Lachin, J. M. (2000). Statistical considerations in the intent-to-treat principle. *Controlled Clinical Trials, 21*, 167–89.
- Lancaster, T., & Stead, L. F. (2005). Individual behavioural counselling for smoking cessation. *Cochrane Database of Systematic Reviews, 2*, CD001292.
- Liu, J., Peterson, A. V., Kealey, K. A., Mann, S. L., Bricker, J. B., & Marek, P. M. (2007). Addressing challenges in adolescent smoking cessation: Design and baseline characteristics of the HS group-randomized trial. *Preventive Medicine, 45*, 215–25.
- Luciano, C., Rodríguez, M., & Gutiérrez, O. (2004). A proposal for synthesizing verbal contexts in experiential avoidance disorder and acceptance and commitment therapy. *International Journal of Psychology and Psychological Therapy, 4*, 377–394.
- Luciano, M. C., & Hayes, S. C. (2001). Trastorno de evitación experiencial. [Experiential avoidance disorder]. *International Journal of Clinical and Health Psychology, 1*, 109–157.
- Marlatt, G. A., & Gordon, J. R. (1985). *Relapse prevention*. New York: Guilford Press.
- Middleton, E. T., & Morice, A. H. (2000). Breath carbon monoxide as an indication of smoking habit. *Chest, 117*, 758–763.
- Niaura, R., & Abrams, D. B. (2002). Smoking cessation: Progress, priorities, and prospectus. *Journal of Consulting and Clinical Psychology, 70*, 494–509.
- Otto, M. W., Powers, M. B., & Fischmann, D. (2005). Emotional exposure in the treatment of substance use disorders: Conceptual model, evidence, and future directions. *Clinical Psychology Review, 25*, 824–39.
- Perkins, K. A., Conklin, C. A., & Levine, M. D. (2007). *Cognitive-behavioral therapy for smoking cessation: A practical guidebook to the most effective treatments*. New York: Routledge.
- Schwartz, J. (1987). *Review and evaluation of smoking cessation methods: The U.S. and Canada 1978–1985*. Bethesda, MD: Division of Cancer Prevention and Control, National Cancer Institute, Public Health Service (NIH Publication no. 87–2940).
- Shiffman, S. (1993). Assessing smoking patterns and motives. *Journal of Consulting and Clinical Psychology, 61*, 732–742.
- Shiffman, S., Gwaltney, C. J., Balabanis, M. H., Liu, K. S., Paty, J. A., Kassel, J. D., et al. (2002). Immediate antecedents of cigarette smoking: An analysis from ecological momentary assessment. *Journal of Abnormal Psychology, 111*, 531–545.
- Shiffman, S., & Waters, A. J. (2004). Negative affect and smoking lapses: A prospective analysis. *Journal of Consulting and Clinical Psychology, 72*, 192–201.

- Stead, L. F., & Lancaster, T. (2005). Group behaviour therapy programmes for smoking cessation. *Cochrane Database of Systematic Reviews*, 2, CD001007.
- Stead, L. F., Perera, R., Bullen, C., Mant, D., & Lancaster, T. (2008). Nicotine replacement therapy for smoking cessation. *Cochrane Database of Systematic Reviews*, 1, CD000146.
- Stead, L. F., Perera, R., & Lancaster, T. (2006). Telephone counseling for smoking cessation. *Cochrane Database of Systematic Reviews*, 3, CD002850.
- Sussman, S., Sun, P., & Dent, C. W. (2006). A meta-analysis of teen tobacco use cessation. *Health Psychology*, 25, 549–557.
- U.S. Public Health Service. (1964). *Smoking and health: Report of the advisory committee to the Surgeon General*. Washington, DC: U.S. Government Printing Office.
- Velicer, W. F., Prochaska, J. O., Rossi, J. S., & Snow, M. G. (1992). Assessing outcome in smoking cessation studies. *Psychological Bulletin*, 111, 23–41.
- Wilson, K. G., & Luciano, M. C. (2002). *Terapia de Aceptación y Compromiso (ACT). Un tratamiento conductual orientado a los valores* [Acceptance and Commitment Therapy (ACT). A values-oriented behavioural treatment]. Madrid: Pirámide.

Received February 24, 2009

Revision received August 26, 2009

Accepted August 27, 2009 ■