Original investigation

Positive Psychotherapy for Smoking Cessation: A Pilot Randomized Controlled Trial

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Abstract

Objective: Greater depressive symptoms and low positive affect (PA) are associated with poor smoking cessation outcomes. Smoking cessation approaches that incorporate a focus on PA may benefit smokers trying to quit. The purpose of this study was to conduct a pilot randomized clinical trial to compare standard smoking cessation treatment (ST) with smoking cessation treatment that targets positive affect, termed positive psychotherapy for smoking cessation (PPT-S).

Method: Smokers who were seeking smoking cessation treatment were assigned by urn randomization to receive, along with 8 weeks of nicotine replacement therapy, either ST ($n = 31$) or PPT-S ($n = 35$). Seven-day point prevalence smoking abstinence was biochemically confirmed at 8, 16, and 26 weeks.

Results: Compared to ST, a greater percentage of participants in PPT-S were abstinent at 8 weeks, 16 weeks, and 26 weeks, but these differences were nonsignificant. In a more statistically powerful longitudinal model, participants in PPT-S had a significantly higher odds of abstinence (adjusted odds ratio [AOR] = 2.75; 95% CI = 1.02, 7.42; $p = .046$) across follow-ups compared to those in ST. The positive effect of PPT-S was stronger for those higher in PA ($OR = 6.69$, 95% CI = 1.16, 38.47, $p = .03$). Greater use of PPT-S strategies during the initial 8 weeks of quitting was associated with a less steep decline in smoking abstinence rates over time ($OR = 2.64$, 95% CI = 1.06, 6.56, $p = .04$).

Conclusion: This trial suggests substantial promise for incorporating PPT into smoking cessation treatment.

Introduction

Greater depressive symptoms and low positive affect (PA) prior to a smoking cessation attempt^{1–4} and negative changes in depressive symptoms and PA following quitting^{5–7} are associated with poorer cessation outcomes. Therefore, smoking cessation interventions that incorporate mood management strategies have generated considerable interest, and results have supported that such approaches enhance smoking cessation outcome in those with current or past

depression⁸; they do not appear to benefit those without depression vulnerability^{9–11} or to have a direct effect on improving moods.^{12,13} Most studies have applied interventions based in traditional (cognitive) behavioral therapy that are depression-focused and aimed at ameliorating deficits, which appear to have greatest appeal for those with current depression.¹⁴ An alternative approach, consistent with the emphasis of positive psychology,¹⁵ would be to focus more on personal strengths and PA, which might have broad appeal to those without depression-related vulnerabilities.

A variety of positive psychology interventions (PPIs) have been shown effective at reducing depressive symptoms and enhancing PA across multiple clinical and nonclinical samples,^{16,17} but the application of PPIs to health behavior has been rare. We recently described development of positive psychotherapy for smoking cessation (PPT-S), which incorporates PPIs in an effort to enhance positive feelings and cognitions during quitting.¹⁸ PPT-S was feasible and acceptable in a sample of 19 smokers with low PA, with 31.6% of participants confirmed abstinent at 6 months.¹⁸

The purpose of the present study was to conduct a pilot randomized clinical trial to compare the acceptability and efficacy of PPT-S versus a standard smoking cessation treatment (ST). We hypothesized that PPT-S, compared with ST, would result in higher point-prevalence smoking abstinence rates at 8, 16, and 26 weeks post quit date. Because of our desire to test PPT-S in a wider population and following clinical observations from our initial study that those with relatively higher baseline PA engaged more readily in PPIs, we recruited participants without regard for PA level and tested whether the effects of PPT-S were stronger among those with higher baseline PA. To examine potential mechanisms of action for PPT-S, we tested whether PPT-S, compared with ST, resulted in decreased depressive symptoms and increased PA and whether greater use of PPT strategies during treatment facilitated smoking cessation.

Method

Participants

Participants were 66 smokers recruited from the community who wanted help quitting smoking. Participants had to (a) be at least 18 years old; (b) smoke at least 5 cigarettes per day for longer than 1 year with no other nicotine/tobacco product use in the past month; (c) be willing to use transdermal nicotine patch; and (d) report at least a 5 on a 0 to 10 scale rating the importance of quitting smoking (where 10 = extremely important). Participants were excluded if they (a) were currently experiencing psychotic symptoms, affective disorder, or substance use disorder other than nicotine dependence; (b) were taking prescribed psychotropic medication or receiving psychotherapy; (c) were concomitantly using other pharmacotherapies for smoking cessation; or (d) had contraindications to use of nicotine patch.

Sample Size and Power

As a pilot randomized clinical trial, this study was not designed to have adequate power to detect a desired effect size. Rather, we decided *a priori* to enroll 80 participants in the trial in order to obtain an evaluable sample of at least 60 participants with which we could examine the potential promise of PPT-S in terms of acceptability, smoking outcomes, and potential mechanisms of action.

Procedures

The Brown University Institutional Review Board approved procedures for this study. Potential participants were recruited through advertisements on newspaper, radio, television, internet, public transportation, and other community bulletin boards from November 2011 to April 2013. They were screened by telephone before completing a baseline interview, where they completed informed consent and eligibility confirmation (see Figure 1 for participant flow). Randomization occurred after baseline once a first treatment session was scheduled.

Randomization

Urn randomization was used to assign participants to PPT-S or ST^{19,20} to ensure balancing on sex, the Fagerström Test for Nicotine Dependence score (FTND),²¹ and PA as assessed by the respective subscale from the Center for Epidemiologic Studies Depression Scale (CES-D).²² Data for the randomization were sent by research assistants to the project coordinator, who conducted the computer-based urn randomization and informed the treatment provider of treatment assignment.

Of the 77 participants randomized to either ST or PPT-S, 66 showed for an initial session of counseling, at which point they learned about the condition to which they were assigned. Using a modified intent-to-treat approach, any participant starting treatment and therefore having contact with treatment content that differed by assigned condition, was included in the analysis as part of the evaluable sample. Demographic and clinical characteristics of the 66 participants in the evaluable sample are shown by treatment condition in Table 1. The 11 participants randomized to treatment condition (7 in ST; 4 in PPT-S) but not attending any sessions did not differ significantly from those in the evaluable sample on any of these baseline measures.

Assessments

Participants completed brief assessments at each treatment session. In addition, follow-ups were conducted at 8, 16, and 26 weeks after quit date. Research assistants who conducted follow-up interviews were not informed of treatment condition assignment.

Treatment Conditions

Both ST and PPT-S included six sessions (five weekly sessions and a final session that occurred 2 weeks later) with session 1 lasting 60 min and later sessions lasting 30 min. Manuals are available upon request. Standard treatment was based on clinical practice guidelines²³ and focused on problem solving regarding high-risk situations for smoking relapse, providing support within the treatment, and encouraging participants to seek support for quitting smoking outside of treatment. All participants received transdermal nicotine patch beginning on their scheduled quit date, which coincided with the third session, 2 weeks after the initiation of treatment. Participants who smoked more than 10 cigarettes per day were given 4 weeks of 21-mg patch, followed by 2 weeks of 14-mg and 2 weeks of 7-mg. Participants smoking 5–10 cigarettes per day were given 6 weeks of 14-mg patch and 2 weeks of 7-mg. Six female doctoral-level (5 in clinical psychology and 1 in nursing) counselors with prior experience in behavioral health counseling provided treatment in both conditions. They completed 20 hr of training in the protocols, including assigned readings, listening to audiotaped sessions from the treatment development study, and group didactic sessions, and discussed each case at weekly clinical group supervision, which was led by a licensed clinical psychologist with expertise in smoking cessation (CWK).

Standard Treatment

In ST, 30 min of session 1 and 20 min in subsequent sessions were dedicated to teaching progressive muscle relaxation, which has not been shown to improve smoking cessation outcomes²³ and was included to match contact time with PPT-S. Participants were instructed to use these techniques whenever they wanted to reduce stress.

Positive Psychotherapy for Smoking Cessation

The PPT-S protocol¹⁸ integrated smoking cessation treatment with exercises from Positive Psychotherapy²⁴ and other positive psychology

Figure 1. CONSORT diagram showing participant flow. CONSORT = Consolidated Standards of Reporting Trials; PPT = positive psychotherapy; ST = standard treatment.

interventions.²⁵ Thirty minutes of session 1 and 20 min in subsequent sessions were dedicated to PPT-specific content. At each session, PPT exercises were introduced, and participants were given related homework assignments. Exercises included Three Good Things, in which participants were asked to write down three good things that happened each day; a Gratitude Letter, in which participants identified a person in their life whom they had never appropriately thanked, wrote and delivered the person a letter, and enlisted that person's support during the quit attempt; Savoring, which instructed participants on savoring everyday life activities two times daily for 2 min; Active-Constructive Responding, which involved actively responding to good things that happened in other people's lives by expressing genuine enthusiasm and interest; and, Savoring Acts of Kindness, which required participants to write down acts of kindness they performed or observed others perform each day. Finally, participants were encouraged to utilize their personal "Signature Strengths" (e.g., bravery, curiosity)—as assessed via the Values in Action Survey²⁶—to

help them during their quit attempt. Participants were provided a list of personalized strength-based suggestions for strategies to use (e.g., someone high in kindness might treat their children to ice cream with the money saved by not smoking¹⁸).

Measures

At baseline, participants provided demographic and smoking history information. The Structured Clinical Interview for DSM-IV (SCID)²⁷ was used to determine lifetime prevalence of key Axis I diagnoses and diagnostic exclusions and has demonstrated reliability.²⁸ The FTND was used to assess severity of nicotine dependence; scores range from 0–10.²¹

Mood Outcomes

We used the CES-D to assess depressive symptoms and the Positive and Negative Affect Schedule (PANAS)²⁹ to assess current mood

Table 1. Baseline Participant Characteristics by Treatment Condition

Demographic and clinical characteristics	ST (<i>n</i> = 31), <i>n</i> (%) or <i>M</i> (<i>SD</i>)	PPT-S (<i>n</i> = 35), <i>n</i> (%) or <i>M</i> (<i>SD</i>)
Female	14 (45.2%)	19 (54.3%)
Race		
White	25 (80.7%)	29 (82.9%)
Black/African-American	3 (9.7%)	6 (17.1%)
Other ^a	3 (9.7%) ^a	0 (0.0%)
Hispanic/Latino	2 (6.4%)	0 (0.0%)
Years of age	44.5 (13.8)	47.4 (13.1)
Unemployed	14 (45.2%)	15 (42.9%)
Years of education ^b	12.5 (2.2)	13.9 (2.5)
Number of cigarettes per day	18.7 (9.6)	18.8 (8.4)
FTND	5.4 (2.2)	5.6 (2.4)
Past major depressive disorder	9 (29.0%)	13 (37.1%)
Past alcohol dependence	14 (45.2%)	18 (51.4%)
CES-D positive affect	2.3 (0.7)	2.4 (0.5)
CES-D total score	9.9 (8.7)	9.5 (6.3)
PANAS positive affect	26.2 (7.1)	25.2 (8.0)
PANAS negative affect	3.2 (4.7)	2.6 (3.1)

CES-D = Center for Epidemiological Studies Depression Scale; FTND = Fagerström Test for Nicotine Dependence; PANAS = Positive and Negative Affect Scale; PPT-S = positive psychotherapy for smoking condition; ST = standard treatment.

^aIncludes 1 Native American, 1 Asian, and 1 multiple race participant.

^bSignificant group difference, *p* = .02.

state at baseline, treatment sessions, and each follow-up. The CES-D is a 20-item scale that assesses symptoms during the past week using a 0 = “Rarely” to 3 = “Most or all of the time” rating scale with a maximum score of 60. It has a four-factor solution³⁰ that distinguishes somatic symptoms, negative affect, PA, and interpersonal symptoms. We examined the PA factor separately given that it robustly predicts smoking cessation outcome.⁴ The PANAS has two 10-item scales that assess positive (e.g., enthusiastic) and negative (e.g., irritable) affect at the time of assessment on a 0 = “Very Slightly or not at all” to 4 = “Extremely” rating scale.

Treatment Adherence

All sessions were audio recorded. One session from each participant was randomly selected and coded for adherence by a research assistant using a checklist that included each topic covered in the treatment protocols for ST and PPT; the number of topics within each session ranged from 18 to 21. Specific items were included for elements common to both treatments (e.g., “gives direction on patch use”) as well as behaviors specific to ST (e.g., “describes progressive muscle relaxation”) and PPT (e.g., “discusses signature strengths”, “explains savoring”).

Treatment Satisfaction

Satisfaction with treatment was assessed at the 8-week follow-up with the Client Satisfaction Questionnaire (CSQ-8),³¹ an 8-item measure with 4-point response scales where 0 reflects very low satisfaction and 3 reflects very high satisfaction. The CSQ has shown good reliability and validity.³²

Quitting Strategies

The Quitting Strategies Questionnaire was administered at the 8-week follow-up. We designed this measure to assess the extent to which participants used strategies taught in both conditions (e.g., used patch as directed, avoided high risk situations; 6 items, α = .79), ST only (“used techniques to help me relax,” 1 item), and PPT-S

(e.g., “focused on the good things that happened each day”; 5 items, α = .84). PPT-consistent strategies were described in a general way (e.g., “I tried to savor the positive and pleasurable experiences in my daily life”) so that participants in either condition could report engaging in them. Responses were measured on a 1 = “strongly disagree” to 5 = “strongly agree” Likert-type scale and queried about strategy use while quitting smoking.

Smoking Outcomes

Seven-day point-prevalence smoking abstinence was assessed 8, 16, and 26 weeks after quit date. Self-reported abstinence of at least 7 days prior to the assessment day was verified at all assessments by alveolar carbon monoxide (CO) using a Bedfont Scientific Smokelyzer® breath CO monitor, with a CO $\leq$ 8 ppm confirming abstinence, and at 16 and 26 weeks with saliva cotinine radioimmune assay analysis, with cotinine $\leq$ 15 ng/ml confirming abstinence.³³ Complete smoking data verified either biochemically or by significant other report were obtained from 90.9%, 81.8%, and 78.8% of participants at the 8-, 16-, and 26-week follow-ups, respectively. The odds of having verified smoking data did not differ by condition (*p* = .98).

For our primary analyses, only individuals who had smoking abstinence confirmed at a given follow-up were considered abstinent; those with missing data were considered non-abstinent. Thus, all 66 participants entering treatment were included, and our reported abstinence rates correspond to the reporting of abstinence in most smoking cessation trials. Results using only available data yielded equivalent conclusions as those using a “missing = smoking” assumption and therefore are not detailed here. Our secondary smoking outcome was continuous smoking abstinence, defined as reporting no smoking from quit date onward with verification at each follow-up.

Data Analysis Plan

We examined session attendance, client satisfaction, and counselor adherence by condition using chi-square and *t* tests. We then

examined point-prevalence smoking outcomes and our four mood-related outcomes: PANAS negative affect and positive affect, CES-D total score, and CES-D PA score. To examine the effect of treatment within the context of other covariates that impact outcome, repeated measures analyses were conducted using generalized estimating equations (GEE)³⁴ using PROC GENMOD in SAS (SAS Institute Inc., 2011). Analyses controlled for factors in the urn randomization (gender, FTND, and the baseline CES-D PA) given that those were selected a priori as key predictors of outcome and can increase precision of treatment estimates.³⁵ Given the large number of treatment providers relative to the number of participants, data were too sparse to model potential provider effects.

For smoking outcomes, point prevalence abstinence at the three follow-ups was the dependent variable and a binomial distribution and logit link function were specified. For mood outcomes, we analyzed effects of PPT-S from quit date forward (i.e., sessions 3-6 and the 8-, 16-, and 26-week follow-ups) with a Gaussian distribution specified. Analyses of mood outcomes included the respective dependent variable at session 1 as a covariate. For both smoking and mood outcomes, we tested the main effect of PPT-S along with the covariates in the first step and then tested a PPT-S $\times$ time interaction to determine whether the effects of PPT-S relative to ST weakened over time, coding the initial assessment of the dependent variable as time = 0. Finally, we entered the interaction between PPT-S and baseline CES-D PA to test whether the intervention was more effective for those with high PA.

We conducted *t* tests and regression analyses to determine whether treatment conditions differed in their use of core smoking cessation and PPT strategies. We then entered engagement in these strategies as predictors of smoking cessation in the GEE model describe above. We did not conduct formal mediation analyses given the limited sample size of this pilot randomized clinical trial (RCT).

Results

Treatment Attendance, Satisfaction, and Adherence

Participants attended an average of 5.1 (*SD* = 1.5) sessions in ST (64.5% completed all six sessions) and 5.3 (*SD* = 1.3) sessions in PPT-S (71.4% completed all sessions), $t(64) = 0.46$, $p = .65$. Counselor adherence to protocol was excellent. In ST, 97.3% of standard treatment protocol topics across sessions sampled were completed, compared to 97.4% in PPT-S. For topics specific to relaxation training in ST, 95.6% were covered in ST versus 4.0% in PPT-S. For topics specific to PPT-S, 99.4% were covered in PPT-S, compared to 0.7% in ST. Client satisfaction at post-treatment was high in both ST ($M = 2.6$, $SD = 0.5$) and PPT-S ($M = 2.5$, $SD = 0.5$) and did not differ by treatment condition, $t(57) = 0.28$, $p = .78$.

Serious Adverse Events

One participant in PPT-S was hospitalized during the study for complications related to chronic obstructive pulmonary disease, and no serious adverse events were reported in ST.

Smoking Outcomes

Biochemically-confirmed 7-day point-prevalence abstinence was 40.0% in PPT-S versus 25.8% in ST at 8 weeks (odds ratio [OR] = 1.91; 95% CI = 0.67, 5.48; $p = .22$); 22.9% versus 6.5% at 16 weeks (OR = 4.30; 95% CI = 0.84, 22.1; $p = .06$); and 17.1% versus 6.5% at 26 weeks (OR = 3.00; 95% CI = 0.56, 16.11; $p =$

.18). Continuous abstinence rates were 11.4% in PPT-S versus 0.0% in ST; OR not computable; Fisher's exact test p value = .07.

In the initial GEE model with a priori covariates (gender, FTND, baseline CES-D PA), PPT-S was associated with more than twice the odds of abstinence across follow-up compared with ST (OR = 2.75; 95% CI = 1.02, 7.42; $p = .046$). Higher FTND scores were associated with a lower odds of abstinence (OR = 0.75; 95% CI = 0.61, 0.92; $p = .005$), and the odds of abstinence decreased significantly over the three follow-ups, OR = .45; 95% CI = 0.31, 0.66; $p < .0001$; gender and baseline CES-D PA were not significant predictors of outcome. The ORs for PPT-S calculated with no covariates in the model (OR = 2.34; 95% CI = 0.89, 6.16; $p = .08$) and calculated with education (which was imbalanced by condition) added to the a priori covariates (OR = 2.24; 95% CI = 0.81, 6.14; $p = .12$) yielded similar effect sizes but were over the $p < .05$ threshold. The interaction between PPT-S and time (OR = 1.44; 95% CI = 0.56, 3.75; $p = .45$), indicated no significant differences in treatment effect over time.

A significant interaction between PPT-S and CES-D PA (OR = 6.69, 95% CI = 1.16, 38.47; $p = .03$) indicated that the effect of PPT-S was stronger at higher levels of baseline PA. Model-based estimates indicated that for those high in PA (1 *SD* above the mean), PPT-S compared with ST predicted a substantially higher odds of abstinence (OR = 8.30; 95% CI = 1.83, 37.73; $p = .006$), whereas for those low in PA (1 *SD* below the mean), the effect was in the opposite direction and nonsignificant (OR = 0.82; 95% CI = 0.18, 3.81; $p = .80$).

Mood Outcomes

Positive and negative moods during treatment and across the follow-up are shown in Figure 2 and CES-D total scores and PA scores are in Figure 3. The figures suggest no discernable advantage of PPT-S versus ST, and at session 3 ST had significantly lower CES-D total and higher PA scores than PPT-S. The main effect of PPT-S and the PPT-S $\times$ time interaction were not significant in any GEE model tested, $ps > .20$. The interaction between PPT-S and baseline CES-D PA was nonsignificant for all mood outcomes, $ps > .35$.

Smoking and PPT-Specific Quitting Strategies

Participants in ST ($M = 4.0$, $SD = 0.9$) and in PPT-S ($M = 4.1$, $SD = 0.6$) did not differ in their reported use of core smoking cessation strategies at the 8-week follow-up, $t(57) = .76$, $p = .45$. Those in ST reported greater use of relaxation techniques ($M = 3.9$, $SD = 1.0$) compared to those in PPT-S ($M = 3.4$, $SD = 1.2$), although this difference did not reach statistical significance, $t(57) = 1.77$, $p = .08$. Those in PPT-S reported significantly greater use of PPT-consistent strategies ($M = 4.3$, $SD = 0.5$) than those in ST ($M = 3.9$, $SD = 0.7$), $t(57) = 2.35$, $p = .02$. Given that PPT-S effects on smoking differed by baseline PA, we ran a regression analysis predicting use of core smoking cessation strategies and PPT strategies with baseline PA, gender, FTND, and PPT-S as predictors. For core strategies, baseline PA was the only significant predictor, with higher PA associated with greater use of the strategies, $B = 0.36$; 95% CI = 0.04, 0.69; semipartial r^2 (sr^2) = .08; $p = .03$. Higher PA was strongly associated with greater use of PPT strategies ($B = 0.41$; 95% CI = 0.18, 0.65; $sr^2 = .17$; $p = .0008$), and PPT-S also was a unique predictor of greater PPT strategy use, $B = 0.32$; 95% CI = 0.04, 0.61; $sr^2 = .07$; $p = .03$. A post hoc test of the interaction between PPT-S and baseline PA as a predictor of PPT strategy use was nonsignificant, $p = .89$.

Figure 2. PANAS scores over the 6 sessions of counseling and the 3 follow-ups. Error bars represent standard errors. PANAS = Positive Affect and Negative Affect Scales; NA= Negative Affect; PA = Positive Affect. Scores on each scale can range from 0 to 40. ST = standard treatment. PPT-S = positive psychotherapy for smoking cessation.

We added use of core smoking strategies and PPT strategies to the GEE models predicting smoking abstinence. The main effects of both terms were nonsignificant, $p > .18$. However, in a second step in the model, the interaction between PPT strategies and time was significant ($OR = 2.64$; 95% CI = 1.06, 6.56; $p = .04$), indicating that greater use of PPT strategies during the initial 8 weeks of quitting was associated with a less steep decline in smoking abstinence rates over time.

Conclusion

Consistent with our initial study to develop PPT-S,¹⁸ results indicate that it is feasible to incorporate PPT into smoking cessation treatment. Rates of session attendance and satisfaction in PPT-S were comparable to ST. The treatments could be distinguished in the content of the counseling delivered as rated by coders blind to treatment assignment, and adherence to protocol was excellent.

At all follow-ups, PPT-S showed a numerically, but not statistically, higher smoking abstinence rate compared with ST, and this numerical advantage was also seen for continuous abstinence. The GEE analysis showed that those receiving PPT-S, compared to those in ST, had more than twice the odds of biochemically confirmed

Figure 3. CES-D Scores over the 6 sessions of counseling and the 3 follow-ups. Error bars represent standard errors. CES-D = Center for Epidemiologic Studies Depression Scale. Total scores can range from 0 to 60. Positive Affect scores are the item average for positive affect items on the CES-D and range from 0 to 3. ST = standard treatment. PPT-S = positive psychotherapy for smoking cessation.

abstinence, and this difference was significant in a model including a priori covariates. Furthermore, there was a significant interaction between PA and condition assignment, where the overall advantage for PPT-S grew stronger at higher levels of baseline PA. Smokers with relatively high PA may engage more readily with PPT exercises, which focus on enhancing attention to positive features of one's life that are already present. Indeed, higher baseline PA was a significant predictor of engaging in more PPT-consistent strategies regardless of treatment condition.

With regard to mood outcomes, there was no indication on any measure that PPT-S relative to ST had a meaningful effect on either immediate mood state or moods over a given week. The initial PPT-S development study showed that mood outcomes were essentially flat during quitting for those receiving PPT-S.¹⁸ Figures 2 and 3 show similar results. Although there was a spike in negative mood around the quit date, it quickly abated suggesting that mood changes were minimal in both PPT-S and ST. Therefore, the relative advantage in smoking outcome of PPT-S over ST does not appear to be due to improved mood overall. This mirrors results of cognitive behavioral

mood management interventions for those with current or past depression where an advantage in smoking cessation outcome has been demonstrated relative to a control condition without any advantage on mood outcomes.^{10,13}

Analysis of the strategies participants reported using during their quit attempt indicated that those in PPT-S used core strategies for quitting at the same level as those in ST, while engaging in more PPT-consistent strategies. Importantly, greater use of PPT strategies predicted a less steep decline in abstinence over time. The mechanisms that account for such an effect are unknown, but we speculate that PPT-S may work to increase abstinence by (a) deepening personal commitment to quitting smoking by connecting it to personal values and strengths or (b) increasing the relative reward value of remaining abstinent by consciously linking quitting to other natural reinforcers in one's life.

Limitations

It is important to note that this was a pilot RCT with a limited sample size not powered to detect specific treatment effect sizes or to test fully potential mechanisms of action. A larger scale trial with less restrictive inclusion criteria is needed to confirm whether PPT-S is more efficacious than ST and why that might be so. The overall smoking abstinence rates in this sample, which showed a very high rate of unemployment, were relatively low, especially in ST. Our treatment development study, conducted in the same location with very similar procedures, found substantially higher quit rates for PPT-S.¹⁸ Pairing PPT-S with other methods of enhancing smoking outcomes such as the nicotine lozenge or text-messaging may be worthwhile. This study relied on weekly measures of mood states and retrospective recall of use of PPT strategies. Methods for collecting these measures in real time might shed additional light on how PPT-S might work. Finally, the sample was largely non-Hispanic White, and future studies should evaluate whether the effects of PPT-S differ by race or ethnicity.

Conclusions

Despite the limitations noted above, this trial suggests substantial promise for incorporating PPT into smoking cessation treatment. In particular, greater use of PPT strategies may enhance the odds of smoking abstinence over the longer-term, but these results require replication. Future development of PPT-S can be devoted to making the approach more effective for those with low PA, perhaps by using additional supports for engaging in PPT-S strategies such as text-messaging or the use of a smartphone app.

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Declaration of Interests

None declared.

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