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Rescuing cognitive and emotional regulatory skills to aid smoking prevention in at-risk youth: A randomized trial

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Abstract

Adolescence is a vulnerable period for smoking initiation, with disadvantaged teens particularly at risk. In addition, emotional and cognitive dysregulation is associated with an increased risk of smoking and makes it particularly challenging to benefit from standard substance use prevention interventions. The goal of the current study is to investigate the extent to which interventions designed to improve cognitive (working memory) and emotional (distress tolerance) regulatory processes enhance the effectiveness of a standard smoking prevention informational intervention. We will study adolescents (12–16 years of age) predominantly from racial/ethnic-minority and low-income households. Proximal smoking-risk outcome measures are used to allow testing of prevention models outside a full longitudinal study. We hope to generate new insights and approaches to smoking prevention among adolescents from lower socio-economic status (SES) by documenting the influence of working memory training and distress tolerance (mindfulness) interventions on cognitive/affective targets that place individuals at risk for smoking initiation and maintenance.

Clinical trials registration:

Keywords

Smoking prevention; Adolescence; Distress tolerance; Working memory

1. Introduction

Despite declines in cigarette use during the past several decades, smoking remains prevalent (19.3%) among U.S. adults, resulting in an estimated 443,000 premature deaths annually [1]. Around 70% of current smokers begin smoking before age 18; of those who do not, few are

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likely to become smokers as adults [2]. Adolescents may be particularly vulnerable to smoking initiation given the heightened sensitivity to life stressors and negative affect [28] and the increased novelty and sensation seeking [29] that characterize this developmental period.

Moreover, adolescents from low socio-economic status (SES) families smoke at higher rates than their higher-SES peers [25,26], and have greater increases in smoking over time [27]. Individuals from low-SES families also benefit less from standard informational smoking prevention [1,9], exacerbating health disparities across SES levels. One possible explanation is that cumulative stressors associated with poverty disrupt cognitive [156,157] and emotional [158] regulatory processes, thereby increasing the likelihood of smoking initiation and undermining the efficacy of prevention programs. The current trial evaluates whether interventions aimed at rescuing these regulatory processes can be used to augment a standard smoking prevention intervention among low-SES adolescents.

One such regulatory process is working memory (WM), which contributes to the ability to maintain long-term goals in the face of conflicting goals [149]. Indeed, impaired WM predicts smoking initiation in adolescents [15], and is further linked to addiction potential through its strong inverse relation with delay discounting—i.e., preference for smaller immediate over larger delayed rewards [40,41]. WM training in addicted individuals reduces (improves) delay discounting [23,42]. The validity of WM as a treatment target in adolescents is supported by findings of reliable WM improvements following training [43–45]. Because poverty and stress both negatively influence executive functions such as WM [35–36], low-SES adolescents may particularly benefit from such training.

Another regulatory mechanism tied to successful smoking abstinence is distress tolerance (DT)—i.e., the ability to tolerate emotional and/or physical distress—which predicts both negative mood vulnerability and smoking [54]. DT has repeatedly been found to predict tobacco dependence [161], illicit substance use [60,61], treatment dropout among inner-city substance users [62], and shorter duration of smoking abstinence [64–68]. Treatments that include efforts to improve DT produce better smoking cessation outcomes [22,69–71,159]. Recent work supports similar findings among adolescents [160]. Low-SES adolescents may especially benefit from interventions targeting low DT, because poverty is associated with decreased DT, as measured by task persistence [55], and with the use of negative health behaviors to regulate stress [72]. Moreover, negative affect/stress partially mediates the effects of poverty on smoking cessation difficulties [74]. Mindfulness-based skills improve emotional regulatory abilities and reduce affective distress in clinical samples, while also offering executive function benefits [75,76], higher DT, [77,78] lower levels of nicotine dependence, and fewer tobacco withdrawal symptoms [82–85,165]. Thus, mindfulness-based training is an excellent candidate for offering preventive effects against the risks for smoking conferred by negative affectivity and low DT.

The present study is designed to evaluate the impact of specific cognitive/affective target activation—working memory capacity and distress tolerance—on proximal smoking risk variables in at-risk adolescents. Specifically, the current trial allows evaluation whether adding WM training or mindfulness-based DT training can rescue cognitive/affective self-

regulation processes to strengthen the capacity to resist smoking urges and self-control lapses in at-risk adolescents.

2. Methods

2.1. Study design and objectives

The current study is funded by the R21 grant (R21DA041531) by the National Institute of Drug Abuse (Principal Investigators: Michael W. Otto, Ph.D. and Stacey N. Doan, Ph.D.). Boston University granted Institutional Review Board approval for the study. The study design calls for block randomization of 150 adolescents to one of three intervention conditions: (1) a WM intervention delivered prior to a smoking prevention informational intervention (WM + SPII), (2) a mindfulness-based DT training delivered prior to a smoking prevention informational intervention (DI + SPII), or (3) a control condition offering health education prior to a smoking prevention informational intervention (C + SPII).

Proximal smoking risk outcomes are useful for testing of risk models outside a full longitudinal prevention study. Accordingly, we selected three smoking risk outcome measures that include both well-established self-report measures as well as measures that do not rely on self-report of smoking intentions. First, susceptibility to smoking (defined as not being able to rule out the idea of smoking) is a well-established self-report measure that has repeatedly proven itself to be valuable in large scale ($N > 4000$) studies of smoking onset in adolescents [96–98]. Second, the Implicit Association Test (IAT) has been successfully used to assess implicit associations toward smoking in children. This smoking IAT has shown itself to be valuable in identifying more favorable implicit attitudes in children from households with smoking parents [99]. Also, among smokers, IAT responses are linked with measures of smoking motivation and dependence [100], and are predictive of smoking cessation outcomes [101]. Third, Bickel and associates [102] have proposed that delay discounting may function as a behavioral marker of addiction potential by 1) identifying individuals who are drug-dependent, 2) identifying those at risk of developing drug dependence, 3) acting as a gauge of addiction severity, 4) correlating with all stages of addiction development, and 5) changing with effective treatment. Indeed, higher delay discounting rates are linked to smoking status [103–106] and poorer response to smoking cessation treatment, specifically in low-SES [107] and adolescent samples [108]. Delay discounting is also a mediator of the link between stress and cigarette smoking in adolescents [109]. Finally, a large longitudinal study of adolescents across ages 15 to 21 found that delay discounting predicted both new-onset smoking and increased smoking rates [110].

Smoking risk proximal outcomes—smoking propensity self-report, implicit associations to smoking, and delay discounting are evaluated at one-week and one-month post-intervention. In addition, smoking behavior is assessed at one-month follow-up. The mechanistic targets hypothesized to underlie treatment efficacy—working memory capacity and distress tolerance—are evaluated at one week following the conclusion of treatment. See Table 1 for the mechanistic outcomes; primary and secondary clinical outcome measures; and potential moderator measures.

The following study aims will be addressed by this design:

Specific Aim #1: The feasibility and acceptability of community-based brief interventions targeting working memory and/or distress tolerance in a diverse sample of low-SES adolescents.

Specific Aim #2: The effects of working memory and distress tolerance interventions, relative to a standard informational intervention alone, on specific cognitive-affective targets—delay discounting and distress tolerance—relevant to cigarette smoking initiation and maintenance.

Specific Aim #3: The impact of cognitive/affective target activation on proximal measures of smoking risk/behavior following intervention.

2.2. Participants

The sample will consist of 150 adolescents between the ages of 12 and 16. Reflecting the demographics of the urban Boston community in which we are recruiting, we anticipate that a large proportion of the sample will be from low-income families, balanced between males and females, and with the majority from racial/ethnic minority backgrounds. Inclusion criteria for this study are: (1) between 12 and 16 years of age, and (2) sufficient English proficiency to read and understand the consent form and converse in English.

2.3. Assessments

See Table 1 for timing of the core assessments.

2.3.1. Participant adherence—The number of interventions sessions attended will be used to assess patient adherence.

2.3.2. Interventionist adherence—All mindfulness and health sessions will be audiotaped. Independent master-level raters will rate 10% of sessions for therapist adherence to the key themes and activities outlined in the intervention protocol for that session.

2.3.3. Mechanistic outcome measures

2.3.3.1. Distress tolerance. Because self-report and behavioral measures of DT are only partially correlated [56], we will use both assessment strategies in the current study, with the variable submitted for analysis representing the aggregate z-score (using the baseline means and SDs to determine the z distribution) on the two assessment measures (follow-up analyses will consider the two measures individually).

Perceived Distress Tolerance will be assessed with the 10-Item Distress Intolerance Index (DII) [145], consisting of items from 4 commonly used distress intolerance (DI) measures. McHugh and Otto [154] found that these 10 items best captured the core construct of distress intolerance in a confirmatory factor analysis of DI measures. *Behavioral Distress Tolerance* will be assessed with the computerized Mirror-Tracing Persistence Task (MTPT-C) [146]. This task assesses participants' willingness to persist with a frustrating and difficult task. Participants are asked to trace three shapes on the computer screen using a cursor that moves in reverse to their mouse commands (analogous to a mirror image). On the

third and most difficult shape, participants are given the option to end the task at any time by pressing a computer key. The duration of time (in seconds) spent on this third shape is used to index distress tolerance. Past research has demonstrated this task's validity as a measure of behavioral distress tolerance in adolescents [162].

2.3.3.2. Working memory capacity.: The WM assessment battery will consist of three well-validated computerized WM measures—N-back, Auditory Digit Span, and Corsi Block Tapping tasks—administered via Inquisit. The WM capacity data submitted for analysis will be the z-score (using BL means and SDs) average of participants' scores on these three tasks. The *N-back* is the most utilized task to measure working memory abilities in the lab, with literature indicating that it is a good measure of individual differences in working memory in a research setting [155]. Participants are presented with a continuous series of letters (displayed one-by-one on the screen) and must respond with a button press anytime the current letter matches the one presented N letters back. We will utilize the one-back, two-back, and three-back versions in the current trial, in line with past research involving adolescents [150]. The *Auditory Digit Span* task involves the recall of digits in both forward and backward serial order. Participants are presented with a verbal series of numbers, which get progressively longer throughout the task, and must use the computer mouse to enter the numbers as heard. The first part of the task assesses forward recall, while the second part of the task assesses backward recall. The *Corsi Block Tapping* task is a visuospatial serial recall measure. Nine boxes are presented on the screen and light up in a given order. Participants must recall the order in which the boxes light up and then must click the boxes in the corresponding order. The sequence of boxes that light up initially consists of two boxes, but the sequence gets longer as the task continues.

2.3.4. Proximal smoking risk outcomes

2.3.4.1. Smoking susceptibility self-report.: Consistent with previous work [141], we will measure smoking susceptibility with two items (e.g., “Have you ever been curious about smoking a cigarette: 0 = No, 1 = Yes”) from the pan-Canadian Youth Smoking Survey, and three items repeatedly used in the literature [97,98] (e.g., “If one of your best friends were to offer you a cigarette, would you smoke it: 0 = Definitely no, 3 = Definitely yes”) to create a single composite score that is the sum of these five items providing a continuous score ranging from 0 (no susceptibility) to 11 (highest susceptibility).

2.3.4.2. Smoking IAT.: We use an adapted version of the Brief Implicit Association Test (B-IAT) [151] to assess participants' implicit tendency to appraise smoking related stimuli as either “good” or “bad.” Based on the design of Kahler et al. [101], participants classify stimuli as either belonging to one of two categories (e.g., “Smoking” or “Furniture”) displayed at the top of the screen. These categories are then paired with “I Feel Positive” and “I Feel Negative” categories, in order to tease out participants' implicit associations of smoking.

2.3.4.3. Delay discounting task.: The Delay Discounting Task, adapted from Kirby and Marakovic [153], evaluates the degree to which participants are willing to delay rewards. Participants answer questions that evaluate choice points relative to delaying cash rewards

(e.g., Would you rather have \$10 in 30 days or \$5 at the end of the session). Because we want participants to believe in the efficacy of the task, we randomly select one trial of the task and honor (i.e., pay out) their decision on that particular trial, up to \$10.

2.3.5. Smoking behavior—To complement the smoking propensity measures, we will also collect secondary (limited by the brief follow-up period provided in this smaller-scale pilot study) self-report and objective indices of smoking behavior. Self-reports of smoking status will be collected using timeline follow-back methodology (previously validated for use in adolescent samples) [164] to determine the time frame of smoking initiation if it occurred. We utilize a piCO Smokerlyzer manufactured by Bedfont Scientific Ltd. to measure the content of carbon monoxide (CO) in each participant's breath. CO readings represent a more objective measure of smoking status (4 ppm cutoff) [144] and will be used to verify the self-report data.

2.3.6. Smoking behavior covariates

2.3.6.1. Parental and peer smoking.: We will assess four categories of exposure to parent smoking: (1) both parents nonsmokers; (2) both parents former smokers or, one former smoker and one nonsmoker; (3) one parent a current smoker: the other a nonsmoker or a former smoker (4) both parents current smokers [134]. Affiliation with peers who smoke is a strong psychosocial predictor of smoking initiation and current smoking [94], and will be measured by summing responses to three items asking whether the adolescent's best friend smokes and how many of his or her other four best male and four best female friends smoke (range 0 to 9 friends smoking) [110,135].

2.3.6.2. Sensation seeking.: We will use the Sensation Seeking Scale [139], which has demonstrated acceptable reliability with low-income minority youth [140].

2.3.6.3. Positive and negative affect schedule (PANAS).: The PANAS is a widely used self-report measure of positive and negative affect, with good reliability and validity [152], and has been validated for use with adolescents [163]. Participants rate twenty adjectives describing positive and negative affective states (e.g., "interested," "upset," etc.) on a 5-point Likert scale indicating to what extent they currently feel that way. The negative affective score will be used as an additional exploratory predictor of smoking status alone and in interaction with distress tolerance.

2.4. Interventions

2.4.1. Working memory training—For the working memory training, we will use the *Cogmed RM* program. Participants will be asked to use the program (while supervised) twice a week, each time for an hour, for 8 weeks. Participants will also be encouraged (though not required) to use the program outside the study sessions for approximately an hour each week. The program resembles a video game, and comprises several different "games" that require visuo-spatial working memory (remembering the position of objects) and a combination of verbal and visual working memory (remembering phonemes, letters, and digits). The program adapts to the user's performance. If the trainee is doing well, the to-be-remembered list will increase by one item. If the trainee is struggling, the to-be-

remembered list will decrease by one item. Accordingly, trainees are able to perform at the limit of their ability, stimulating WM capacity adaptation.

2.4.2. Mindfulness-based distress tolerance (DT) training—To enhance DT, we will use a Mindfulness-Based Stress Reduction (MBSR) program that has been specifically adapted for use with adolescents [131]. This version of MBSR follows closely the original conceptualization developed by Kabat-Zinn. The focus is on formal and informal mindfulness practices, which encourage participants to foster intention, attention and attitude. We will make slight modifications to the delivery of the MBSR intervention to take into account the developmental period of our participants (e.g., their attention span) to encourage retention and increase relevancy. These changes will also allow us to match the duration with our WM intervention. Participants are encouraged to practice their mindfulness skills for approximately an hour each week outside of the two weekly sessions.

2.4.3. “Wellness” training control intervention—This wellness-focused control intervention has been used in previous studies [128]. In the current application, it will match the session time of the DT and WM interventions and will omit a focus on smoking (which is specific to the SPII intervention provided across all intervention conditions). Clinician-led group discussions will cover a variety of healthy lifestyle topics, such as healthy eating, stress/time management, and recommended health screenings. To mirror the outside practice component of the DT and WM interventions, participants are provided with wellness-related worksheets (i.e., a food diary) to complete in-between sessions.

2.4.4. Smoking prevention informational intervention (SPII)—This intervention is common to all randomized conditions in the study. We selected the intervention from brief primary-care-based interventions which followed guidelines from the National Institute of Health the US Public Health Service Tobacco Use and Dependence Clinical Practice Guideline. Youth will be provided with age-appropriate education on the norms and health consequences of smoking, affirmation of their non-smoking status, and help in developing a personalized strategy to maintain abstinence. Additionally, we added a motivational interviewing component. That is, the SPII intervention attends to the National Institute of Health the US Public Health Service Tobacco Use and Dependence Clinical Practice Guideline and already provides participants with age-appropriate education on the norms and health consequences of smoking, affirmation of their non-smoking status, and help in developing a personalized strategy to maintain abstinence. Many of these elements are consistent with some of the elements used in the youth MI program for adolescent smokers by Colby et al. [126] We will further incorporate into the SPII intervention Colby and associates’ guided imagery about future smoking/non-smoking life status, and the initiation of our group sessions with open-ended exploration of the perceived likes and dislikes about smoking, and provision of videotaped vignettes developed by the Massachusetts Department of Public Health to stimulate discussion on four content areas: health effects, social consequences, addiction, and financial cost. The SPII is delivered during the final two 1-h sessions of the randomized intervention phase, described below.

2.5. Procedures

2.5.1. Study assessment 1: screening and baseline assessments—

Recruitment procedures include study flyers and direct advertising at local schools and youth community centers. Potential participants are given parental consent forms and, upon return of the signed form, are entered into a lottery for iPad mini prizes, regardless of study inclusion. Assuming a parent or guardian has provided written consent for study participation, the individual is scheduled for an initial baseline screening visit. This evaluation consists of assent procedures, completion of baseline questionnaires, working memory assessments, and CO reading. The assessment battery at both baseline and 1-week follow-up takes approximately 1.5 h to complete, including a 10-min signed assent process at the beginning and a 10-min snack break halfway through the session.

2.5.2. Randomization and intervention phase—Participants are randomized (using a random number table utilizing variable block sizes) to one of three study conditions according to two block randomization factors: sex and parental smoking status. In addition to the well-documented gender-related differences in smoking behavior [166], parental smoking is associated with smoking attitudes among children and confers a significantly higher risk of smoking initiation [90–92]. Crucially, research indicates that parental smoking is one significant mechanism by which low SES translates into youth smoking [93]. Ensuring balance of parental smoking status across the intervention conditions allows evaluation of potential moderating effects of this factor on interventions and outcomes.

Each intervention is delivered twice a week in 1-h sessions over eight consecutive weeks. With the exception of the WM condition, intervention sessions are recorded to ensure reliable administration.

2.5.3. Study assessment 2: 1-week follow-up—This visit is held approximately one week following the final intervention session. Participants complete the Mirror Tracing Task, all three working memory tasks, the Smoking IAT, and the Delay Discounting task on study laptops. Additionally, participants fill out four questionnaires (DII, PLOC, PANAS, and Smoking Susceptibility).

2.5.4. Study assessment 3: 1-month follow-up—This visit is held approximately one month following the final intervention session. Participants complete the Smoking IAT and the Delay Discounting task on study laptops. We reassess smoking status using objective, expired-CO data. Additionally, participants complete remaining outcome questionnaires.

2.6. Data analysis

Analyses for outliers, non-normal distributions, nonlinear relations, and influence statistics will be conducted; data transformation will be considered where appropriate. We will examine missing data patterns and dropout rates and will use pattern mixture modeling to evaluate the influence of missing data on the results [147]. We will use multilevel modeling (MLM) to analyze the data because this trial is an intent-to-treat analysis that includes all participants (which helps maximize power and generalizability). We will model the growth

curves as quadratic since the increase in the DVs may level off between post-treatment and follow-up. The 3 treatment conditions will be coded using 2 dummy variables contrasting each active treatment with control. Time will be alternately centered at post-treatment or follow-up so that the dummy variable contrasts will reflect group differences at those time points. All models will include relevant covariates, including parental smoking, peer smoking, and sensation seeking. Since the relation between the covariates and outcome may differ among treatment conditions (e.g., the relation between parental smoking and smoking risk may be lower in WM + SPII than in C + SPII), interaction terms will allow these relations to vary across treatment conditions. Non-significant interaction terms will be dropped.

2.6.1. Study aim 1—The feasibility/acceptability of school- and community-based brief interventions will be assessed by recruitment and attendance rates across the study period; acceptability (attendance of 80% of interventions by 70% of the randomized sample) will be assessed across the three conditions. The predictive influence of the degree of adherence to study protocols also will be examined in exploratory analyses relevant to Aims 2 and 3.

2.6.2. Study aim 2—We hypothesize that the WM + SPII and DT + SPII interventions, relative to C + SPII, will lead to higher WM and higher DT, respectively. Further, we expect that WM will be higher in WM + SPII than in DT + SPII, and that DT will be higher in DT + SPII than in WM + SPII. The latter contrast will indicate if the two active treatments differ from each other on WM and/or DT; to perform these latter analyses, we will replace the dummy variable contrasting WM + SPII and C + SPII, with a dummy variable comparing WM + SPII to DT + SPII.

2.6.3. Study aim 3—To evaluate the impact of cognitive/affective target activation on proximal smoking risk/behavior following intervention, WM and DT will both be added (simultaneously) as time-varying predictors of outcome in MLM models for each of the 3 measures of smoking risk (susceptibility to smoking, implicit attitudes toward smoking, and delay discounting) and for actual smoking behavior (smoking behavior is dichotomous, so it will be analyzed using a GLMM with a logistic linking function). The regression coefficients for WM and DT predicting outcome in these models will indicate the degree to which each is related to smoking risk over and above the other, and controlling for the parallel change over time between these variables and the outcomes. This approach calculates the relation between both WM and DT with proximal measures of smoking risk within subjects over time. The Benjamini-Hochberg method will be used to correct for multiple statistical tests.

2.6.4. Power analysis—We used PinT 2.12 (Power in Two-Level Models) [148] to calculate the smallest effect size detectable with 0.80 power for each Aim. We assumed 150 total participants with 33% missing data (MLM and GLMM include all participants regardless of missing data, but the power is affected by number of obtained assessments per participant). We also assumed 6 covariates in each of the models. Alpha was set at 0.05. Aims 2 and 3: We have > 0.80 power to detect an effect size of $d = 0.29$ or larger for the Aim-specific predictors in the MLM analyses. We have > 0.80 power to detect an effect size

$\omega^2 = 0.23$ or larger (between a small, $\omega^2 = 0.10$, and a medium, $\omega^2 = 0.30$, effect size) for relevant predictors in the GLMM analysis (actual smoking behavior).

3. Discussion

The purpose of this project is to investigate the extent to which interventions designed to improve cognitive and emotional regulatory processes enhance the effectiveness of standard no-smoking informational interventions among disadvantaged youth. Research provides overwhelming evidence that low-SES youth are at an increased risk for smoking [88,89], and this project is designed to address an existing intervention failure (informational smoking prevention approaches) for this particularly high-risk population. Specifically, given converging evidence from developmental studies, psychopathology studies, intervention studies, and basic research on self-control abilities, we have identified working memory and distress intolerance as transdiagnostic, malleable mechanistic targets in the fight against smoking initiation.

In addition to the novel targets for intervention matched to existing risk factors, this project utilizes novel methodologies, including both implicit and explicit propensities-to-smoke measures. This project has the potential to shift current paradigms for smoking prevention, attending to the rescuing of cognitive/affective self-regulation deficits to provide at-risk adolescents a greater capacity to utilize smoking prevention messaging and resist smoking urges and self-control lapses more generally. Delivery of interventions at community center settings is relevant to ultimate dissemination in prevention intervention applications. Our analytic model examines crucial covariates (e.g., parental smoking, peer smoking, and sensation seeking) of particular relevance to the study cohort in order to provide more precise estimates of the influence of the experimental variables, and to more fully characterize variables of influence for the population under study. The effects of the interventions are studied against a backdrop of a standard antismoking informational intervention, exactly the sort of intervention that has shown less success with low SES adolescents.

The current research was designed to be responsive to the National Institute on Drug Abuse's (NIDA) Prevention Research Program: a developmentally-grounded program of research to prevent or delay the initiation and onset of drug use and/or the progression to abuse. For this exploratory/developmental (R21) research project, documenting a significant effect of interventions on delay discounting and distress tolerance represents a go/no go criterion for future study (Aim 2). Also, to encourage study of the modification of these targets in a larger scale (R01) environment, documentation of significant benefit on proximal measures of smoking risk/behavior is needed (Aim 3). Success with these benchmarks, in a design with adequate feasibility/acceptability would document the need for R01 study in a prevention trial with longer-term follow-up to examine the durability of changes in mechanistic targets as well as smoking outcomes.

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Table 1

Time line and schedule of assessments for study implementation.

Measures	Baseline	Intervention	1-Week post-intervention	1-Month post-intervention
Initial assessment				
Demographics	X			
Additional covariates				
Parental smoking	X			
Peer smoking	X			
Sensation seeking	X			
Mediator variables				
Working memory(WM)	X		X	
Distress tolerance (DT)	X		X	
Proximal smoking risk outcomes				
Smoking susceptibility	X		X	X
Smoking IAT	X		X	X
Delay discounting	X		X	X
Actual smoking outcomes				
Timeline follow-back	X			X
Carbon monoxide	X			X
Affect				
PANAS	X		X	X
Intervention integrity/acceptance				
Participant adherence		X		
Therapist adherence		X		