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Intolerance for Discomfort among Smokers: Comparison of Smoking-specific and Non-specific Measures to Smoking History and Patterns

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Abstract

Introduction—Intolerance of discomfort associated with recent smoking cessation has been studied with only one smoking-specific questionnaire. The present study investigates the extent to which the previously validated Intolerance for Smoking Abstinence Discomfort Questionnaire (IDQ-S) scales share variance with (a) laboratory measures of distress tolerance (Paced Serial Addition Task and a breath-holding task) that have themselves been validated against smoking history, (b) the cold pressor task (not previously validated for smoking), and (c) an anxiety sensitivity questionnaire previously used for a similar purpose. The study then tests the hypothesis that the IDQ-S scales will have a higher correlation with smoking rate and dependence and with number and length of past smoking cessation attempts than will anxiety sensitivity or behavioral distress tolerance tasks since those measures are not smoking-specific.

Methods—Sixty daily smokers recruited from the community completed the measures.

Results—The behavioral tasks and anxiety sensitivity shared little common variance. Anxiety sensitivity correlated more highly with IDQ-S than did the behavioral tasks but only 27% of variance was shared with the IDQ-S Withdrawal Intolerance; no distress tolerance measure correlated significantly with the IDQ-S Lack of Cognitive Coping scale. Only the IDQ-S scales correlated significantly with nicotine dependence, rate and past cessation: Withdrawal Intolerance with nicotine dependence and rate, and Lack of Cognitive Coping with fewer quit attempts.

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Authors Alan Sirota and Damaris Rohsenow designed the study and wrote the protocol. Author Sara Dolan ran the study and designed some additional measures. Author Rosemarie Martin oversaw the conduct of the study and conducted the statistical analysis. Author Christopher Kahler contributed to the conceptualization of these validity analyses in particular in all the aspects pertaining to the PASAT test and made major writing contributions. Author Damaris Rohsenow wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

Conflict of Interest
All authors declare that they have no conflicts of interest.

Conclusions—The smoking-specific measure of intolerance for discomfort may be more useful in smoking research than the less specific measures of distress tolerance.

Keywords

Smoking abstinence; nicotine withdrawal; tolerance for discomfort; coping; anxiety sensitivity

1. Introduction

1.1 Rationale for the Study

Return to smoking is the outcome of a majority of smoking cessation attempts, usually occurring rapidly (Fiore et al., 2008). The aversiveness of tobacco withdrawal symptoms may be part of the reason for rapid relapse (Hughes, 2007). However, some characteristics of the individual smokers must also play a key role in early relapse. In particular, differential ability to endure or tolerate the discomforts of recent tobacco abstinence (withdrawal as well as other abstinence-related sources of stress) is likely to be one individual characteristic that impacts success (Sirota, Rohsenow, MacKinnon, Martin, Eaton, Kaplan, Monti, Tidey, & Swift, 2010). While some patients in our smoking cessation programs report that they cannot tolerate how quitting smoking feels, others seem to suffer the discomfort with stoicism, or rationalize that the outcome will be worth the suffering. Ability or desire to endure unpleasant ongoing tobacco withdrawal symptoms and the loss of the use of cigarettes in other ways (handling, social bonding, etc.) may be low among some smokers. Assessing this ability may help identify those smokers who are at particularly high relapse risk.

In recent years, a related but more general construct, ability to tolerate distress in general, has been investigated in smoking research (Brandon, Herzog, Juliano, Irvin, Lazev, & Simmons, 2003; Brown, Lejuez, Kahler, & Strong, 2002; Brown, Lejuez, Kahler, Strong, & Zvolensky, 2005; Hajek, Belcher, & Stapleton, 1987). This approach grew from the observation that smokers who had difficulty holding their breath seemed to relapse quickly (Hajek et al., 1987). In a variety of studies with smokers, general distress tolerance has most commonly been operationalized as task persistence in physically or emotionally stressful behavioral laboratory tasks (Quinn, Brandon, & Copeland, 1996). The behavioral tasks involved unpleasant physical or psychological stressors. Such tasks have shown correlations with relevant smoking measures and predictive validity. Task persistence in breath-holding or inhaling carbon-dioxide-enriched air correlated with past early smoking lapse or relapse (Brown et al., 2002; Hajek et al., 1987; Hajek, 1991; West, Hajek, & Belcher, 1989), except in a study with low power (Zvolensky, Feldner, Eifert, & Brown, 2001) and predicted future smoking lapse (Brown et al., 2009). Persistence in emotionally stressful tasks also correlated with past (Brown et al., 2002) or future (Brandon et al., 2003) early return to smoking when using paced serial mental arithmetic or mirror tracing tasks but not when using frustrating anagrams. Thus, unwillingness to persist with physical or emotional stressors may indicate unwillingness to persist with the physical and emotional discomforts of smoking abstinence or of treatment. Such tasks, however, while useful in laboratory investigations, may often be difficult to use in clinical settings.

In addition to behavioral tasks, questionnaire measures have also been developed to index traits related to distress tolerance in general (e.g., Simons & Gaher, 2005) that may be relevant to smoking cessation. These measures involve ability to tolerate feeling “distressed or upset” in general (Simons & Gaher, 2005), anxiety specifically (Zvolensky et al., 2006), or physical discomfort in general (Schmidt et al., 2006). The anxiety sensitivity measure has been shown to predict early lapse to smoking (Zvolensky et al., 2009; Brown et al., 2001), and the Distress Tolerance Scale correlates with nicotine dependence (Leyro, Bernstein, Vujanovic, McLeish, & Zvolensky, 2011). However, while negative emotions such as

anxiety are relevant as relapse precipitants, these measures do not assess the ability to tolerate the set of specific physical, affective, and craving symptoms that occur during smoking withdrawal. Anxiety itself is only one of eight or nine valid types of withdrawal symptoms (Hughes & Hatsukami, 1998; Hughes et al., 1999; Hughes, 2007). Anxiety sensitivity may be less relevant to those more concerned about craving, depression, anger, fatigue, or other sequellae of abstinence. However, it may be that a general ability to tolerate distress is involved equally across a variety of types of emotional distress, and thus any index of ability to tolerate emotional or physical discomfort may predict smoking and smoking cessation.

The Intolerance for Smoking Abstinence Discomfort Questionnaire (IDQ-S) is the first measure designed to assess intolerance for the acute discomforts of recent smoking abstinence specifically (Sirota et al., 2010). It was developed in conjunction with questionnaires of intolerance for general physical or emotional discomfort more broadly in order to investigate degree of shared variance with these other aspects of tolerance for discomfort (Sirota et al., 2010). The IDQ-S was found empirically to consist of two reliable and valid components that intercorrelated only r = .27: withdrawal intolerance and cognitive coping (appraising the benefits to be worth the pain, reverse scored as “lack of cognitive coping” to keep the directions consistent). The IDQ-S, especially withdrawal intolerance, was more highly correlated with smoking rate, dependence, and length of past quit attempts than the IDQ measures of tolerance for general emotional or physical discomfort were (Sirota et al., 2010). While all three IDQ measures were found to be valid in relationship to other measures of distress and emotional reactivity, only the IDQ-S showed a consistent relationship to smoking measures and to number and length of past smoking quit attempts.

Intolerance for the discomfort of smoking abstinence is not the same as experiencing or expecting withdrawal any more than anxiety sensitivity is the same as anxiety. Instead, the IDQ-S assesses people’s beliefs about their willingness or ability to experience such distress, and these beliefs while still smoking are likely to affect their willingness to try to quit smoking as well as their success in quitting. As such, the IDQ-S should be a useful clinical tool, unlike the behavioral measures. The degree to which a smoking-specific measure is more useful in practice and in research than a non-specific measure of tolerance for discomfort requires investigation. In addition, the correlation with other measures used in research to assess distress tolerance is also important to establish so as to advance research methodologies. The first step is to determine whether the IDQ-S has a stronger correlation with smoking history and dependence measures than do measures of physical or emotional distress tolerance.

1.2 Aims of the Study

The first purpose of this study is to determine the extent to which the IDQ-S correlates with relevant laboratory measures of distress tolerance that have previously been used in smoking research, and with the anxiety sensitivity measure, which was the only questionnaire to have been used for a similar purpose in smoking research when the study started. The IDQ-S scales have already been validated already against the same smoking variables used to validate these other distress tolerance measures (Sirota et al., 2010). The present analyses are intended to determine the amount of shared variance (e.g., the square of the correlation coefficient) among these distress tolerance measures. If collinear, there might be no need for a laboratory measure if a questionnaire would measure the same construct, and no need for an anxiety measure if a smoking-specific measure would do. Three behavioral tasks that have been used as indicators of unwillingness to persist with physical or emotional stressors were chosen for testing to minimize conceptual overlap. The one frustration task with the strongest support (paced serial mental arithmetic) and the physical task with a demonstrated relationship to smoking relapse (breath-holding) were selected. In addition, a physical

measure of willingness to tolerate pain not previously investigated in relationship to smoking variables (cold pressor task) was chosen due to its high conceptual relationship to distress intolerance.

The other aim is to test the hypothesis that the IDQ-S will have a higher correlation with number and length of past smoking cessation attempts than anxiety sensitivity or the three behavioral tasks do. Since the IDQ-S is easier and less costly for clinicians to use than are behavioral tasks, if it is at least as good an indicator of past success in quitting smoking and therefore in likelihood of success, this would support using the IDQ-S. Due to the specificity of the IDQ-S to smoking, it seems likely to show a higher correlation with smoking history than would less specific assessments.

2. Methods

2.1 Participants

Participants were 60 current smokers recruited during screening in response to advertisements for a laboratory study of a smoking medication, regardless of eligibility for that study. This number would give 80% power to detect a medium sized correlation ($r = .34$) at $p < .05$, two-tailed (Cohen, 1988). The site was the Providence Veterans Affairs Medical Center (PVAMC). Advertisements were placed in community newspapers and around the PVAMC (to reach veterans and visitors).

Inclusionary criteria were 18 to 65 years old and smoked 10 or more cigarettes per day for at least two years (to increase relevance by excluding smokers who are unlikely to experience withdrawal). Exclusionary criteria included urine toxicology positive for opiates, benzodiazepines, cocaine, or cannabis; tobacco other than cigarettes in the past month; currently in a quit-smoking attempt; breath alcohol concentration of ≥ 0.02 g%; diagnosis of chronic obstructive pulmonary disease, asthma, or other breathing problems (the breath-holding task requires adequate pulmonary function); or diagnosis of Reynaud's Disease, neuropathy in hands, and/or allergy to cold temperatures (the cold-pressor task requires adequate temperature sensory ability in hands).

2.2 Procedure

After screening by telephone, recruits were scheduled for the 60–90 min session. They were required to smoke their last cigarette on arrival. After informed consent and passing a screening questionnaire, assessments were administered. The order of presentation was (a) demographics and smoking history measures, (b) the IDQ-S and anxiety sensitivity questionnaires, then (c) the behavioral distress tolerance tasks (counterbalanced, with order of the behavioral tasks rotated within the behavioral tasks). The behavioral distress tolerance tasks were completed approximately 45-minutes following their last cigarette smoked. The questionnaires were presented before the tasks because the tasks were more likely to cause reactivity with the questionnaires than vice versa. Participants were compensated $30. All procedures were approved by the PVAMC's Institutional Review Board.

2.3 Self-report Measures

Questionnaires included a demographic measure, smoking history questionnaire, and Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991). The two best indicators of nicotine dependence are FTND total score and minutes to first cigarette in the morning (low values indicate more dependence) while number of cigarettes per day is relatively independent from dependence as a measure of smoking involvement (Transdisciplinary Tobacco Use Research Center, 2007). The indicators of ability to quit smoking chosen from the smoking history questionnaire were

lifetime number of past 12-hour quit attempts and length of longest past quit attempt, consistent with other studies reviewed (Brown et al., 2001; Brown et al., 2002; Hajek et al., 1987; Hajek, 1991; West et al., 1989).

Anxiety Sensitivity Inventory (ASI; Reiss, Peterson, Gursky, & McNally, 1986), is a 16-item self-report measure of fear from anxiety symptoms, rated on a scale from 0 (not at all) to 4 (extremely). The sum of ratings is scored.

The IDQ-S has 17 items found to fall on two factors used as scales (Sirota et al., 2010): Withdrawal Intolerance (12 items; $\alpha = .90$), reflecting intolerance of affective, cognitive and physical symptoms of tobacco abstinence (e.g., "I cannot stand how I feel when I need a cigarette", "I can't stand the boredom that goes along with quitting cigarettes"); and Lack of Cognitive Coping (5 items; $\alpha = .70$), reverse scoring of various ways to cope cognitively with withdrawal (e.g., "It's OK if I have to feel lousy for a while in order to quit smoking"). Items are rated on a Likert type scale with 1 = strongly disagree to 5 = strongly agree, with the mean of all items used for the total score for each scale.

2.4 Behavioral Measures

2.4.1 Paced serial arithmetic task—A 20-minute computer-administered version of the Paced Auditory Serial Addition Task (PASAT; Holdwick & Wingenfeld, 1999; as modified for computer administration by Lejuez et al., 2003) was used that has demonstrated elevated stress levels and no gender differences (Lejuez et al., 2003). Numbers are shown on a computer screen one at a time. Participants add the most recent number to the previous number and use the mouse to click on the correct sum. They then add the next number to the last number that was shown (not to the previous sum) and click on that sum. They then add a subsequent number to the previous number shown, and so forth. They earn points for every correct sum, with the point total shown in a corner of the screen. For every incorrect answer or failure to answer in the time before the next number is shown, an explosion sound occurs to signal that no point was earned. To provide some incentive for continuing the task, but an incentive weak enough not to create ceiling effects in persistence, participants are told they will receive $5 (gift certificate) at the end of the session if they do better than half of other participants on Trial 3 of this task. Payment was actually given for ≥ 60 seconds persistence (based on Brown et al., 2002). There are three trials at increasing levels of difficulty (decreasing latency between number presentations). Level 1, 2 and 3 last 3, 5 and 10 minutes, respectively. Between Level 2 and 3, a 2 min period was added to permit assessment of self-reports of dysphoria and urge to smoke. In Level 3 only, an "escape" button is displayed to allow participants to terminate the task.

The dependent measure is time to terminate the last task, scored dichotomously in data analyses due to a non-normal (U-shaped) distribution, per Brown et al. (2002). Because this task is theorized to work via state changes in stress, we checked whether the task affected dysphoria or urge to smoke by giving measures before the task and after the second level of the task. (These were not given after the last level because results would be confounded by effects of perceived success or failure on these measures.) The manipulation check measures are Likert ratings of anxiety, irritability, difficulty concentrating, bodily discomfort, and urge to smoke, on 0 (none) to 100 (extreme) scales. Due to high intercorrelations, anxiety, irritability and difficulty concentrating are averaged to form a dysphoria scale.

2.4.2 Breath holding task (Brown et al., 2002; Hajek, 1991)—Participants were asked to hold their breath for as long as they could. The dependent variable was time to exhalation, in seconds.

2.4.3 Cold pressor task—The participant was asked to immerse his/her non-dominant hand and forearm in a container of ice water (33 degrees Fahrenheit) marked to specify point of submersion. Participants were asked to keep their hand in water for as long as they can. The task was stopped after a 5-minute duration for participants who had not removed their hands but participants were not told this. Score is length of time of submersion in seconds.

2.5 Data Analysis Approach

2.5.1 Preliminary analyses—First, all variables were examined for violations of assumptions of normality. Second, change in mean PASAT dysphoria from baseline to end of Trial 2 was investigated using paired t-tests as a manipulation check. Third, intercorrelations were computed between the IDQ-S scales and then among the PASAT, ASI, cold pressor, and breath-holding measures.

2.5.2 Analyses of aims—To analyze the first aim, IDQ-S scores were correlated with ASI, cold pressor and breath holding scores. Participants who quit PASAT Trial 3 prior to 60 seconds (“terminators”) were compared to participants who persisted from 1 to 10 minutes (“completers”) on the other measures using point-biserial correlations instead of t-tests, to allow easy comparison with other correlations. The second aim was analyzed by conducting bivariate correlations of the IDQ-S and other intolerance measures with number of cigarettes per day, minutes to first cigarette, FTND score, number of past attempts to quit smoking that lasted at least 12 hours, and length of longest quit attempt. (Pearson’s correlations were used except for the PASAT for which we used point-biserial correlations). Because these are exploratory analyses designed to compare strengths of relationships and to avoid missing relevant correlations, hypothesis-wide alpha (p) was set at .05 (two-tailed) for these 30 correlations. Bonferroni corrections are known to overcorrect so were not considered. Because our interest is in unique variance rather than residual variance and because we are not interested in the linear combination of variables, multivariate analysis was not considered (Dar, Serlin & Omer, 1994).

3. Results

3.1 Preliminary Analyses

Participant characteristics, smoking history variables and scores on the various intolerance measures are shown in Table 1. PASAT’s time score showed the usual U-shaped distribution with 73% scoring the maximum time (10 min) so was scored dichotomously as planned (10 min versus < 1 min). Number of past 12-hour quit attempts was skewed; first the outlier (score of 200) was changed to one higher than the next highest value (becoming 41) per Tabachnick and Fidell (1996), then, since it was still skewed, it was log-transformed which corrected skewness. Length of the longest quit attempt and minutes to first cigarette of the day were log-transformed which corrected their skewness. Untransformed values are presented to ease interpretation.

Dysphoria increased significantly during the PASAT, $t(62) = 7.32$, $p < .001$, from M = 16.9 ± 16.4 [SD] to M = 36.2 ± 26.2, indicating that it indeed did increase stress levels.

3.2 Intercorrelations

IDQ-S Lack of Cognitive Coping correlated only r = .13, *ns*, with IDQ Withdrawal Tolerance. The other intolerance measures showed good independence from each other: PASAT correlated $r = .15$ with breath holding, $r = .19$ with cold pressor, and $r = -.17$ with the ASI, all *ns*. Breath holding correlated $r = .41$, $p < .001$, with cold pressor, as would be expected of two physical discomfort tasks, and $r = -.16$, *ns*, with ASI. Cold pressor

correlated $r = -.10$, *ns,* with ASI. The two measures of nicotine dependence (FTND and log of time of first cigarette) correlate $r = -.71$.)

3.3 Relationship between IDQ-S and other measures of intolerance for discomfort

As can be seen in Table 2, there is little variance in common between the IDQ-S scales and the behavioral tasks. The only significant relationship was between breath holding and the IDQ-S Withdrawal Discomfort scale, but only 8% of variance was in common (r^2). There is a significant correlation between the ASI and Withdrawal Intolerance but these are by no means collinear – only 27% of variance is shared.

3.4 Relationship of IDQ-S and Other Intolerance Measures with Smoking History

These correlations are displayed in Table 3. The IDQ-S Withdrawal Intolerance scale is the only intolerance measure that correlated significantly with smoking rate and dependence in these community participants, all correlations in the predicted direction. The only statistical trend was for the IDQ-S Lack of Cognitive Coping scale to correlate in the predicted direction with minutes to first cigarette (5% of variance, $p < .07$). The IDQ-S Lack of Cognitive Coping scale was the only measure that correlated significantly with number of past attempts to quit smoking, with a statistical trend for the cold pressor task (5% of variance, $p < .10$), both correlations in the hypothesized direction. No measure correlated significantly with length of past longest smoking quit attempt, and the only statistical trend was for the cold pressor task (6% of variance, $p < .06$) but it was not in the predicted direction.

4. Discussion

4.1 Significance of the Results

This study provides further support for the potential unique value of the IDQ-S scales as compared to measures of intolerance of discomfort that are not smoking-specific. The two IDQ-S scales share only 2% of common variance with each other and have low relationships with anxiety sensitivity, PASAT, breath holding, and the cold pressor task. The highest correlation was between anxiety sensitivity and the IDQ-S Withdrawal Intolerance scale, but that involved no more than 27% common variance. Thus, while the correlation indicates significant underlying commonality, the majority of the variance is non-overlapping. The behavioral PASAT and breath holding tasks appear to be assessing some construct that is considerably different from tolerance of smoking discomfort or sensitivity to anxiety, given their low correlations with both the ASI and the IDQ-S scales. Therefore, given all the correlations, self-reporting one's ability to tolerate the discomfort of smoking seems to involve considerable variance specific to smoking discomfort issues separate from ability to tolerate affect, frustration or physical discomfort.

This is the first study to compare PASAT, breath holding, and anxiety sensitivity in terms of their relative relationships to relevant smoking variables in the same smokers, and the first to compare the two smoking-specific scales against these other measures. While all the correlations were lower than in some previous studies with each measure alone, the comparison of correlation magnitudes between measures is the important point for this study. The IDQ-S scales were the only ones to correlate significantly with smoking rate, dependence, and past cessation; the commonly used behavioral measures of general distress tolerance were not significantly related to the smoking variables in this study. Withdrawal Intolerance had the strongest relationship to the two indicators of nicotine dependence and to number of cigarettes per day. People with high dependence scores may have the strongest withdrawal symptoms which could account for their having the least ability to tolerate these withdrawal symptoms. However, 75% of the variance in the IDQ-S was not shared with

nicotine dependence, showing that the measure is not just a measure of dependence. The IDQ-S items ask about smokers' beliefs about their ability to tolerate these feelings if they were to become abstinent, rather than only asking about withdrawal per se. People are reporting about a different construct from dependence or withdrawal but a construct that should theoretically be related to these, just as the Distress Tolerance Scale correlates modestly with degree of nicotine dependence (Leyro et al., 2011). A future study should assess degree of withdrawal during abstinence and investigate the extent to which the IDQ-S adds to ability to predict future smoking cessation over and above the predictive ability of withdrawal severity and nicotine dependence.

Past number of quit attempts showed the strongest relationship to the IDQ-S Lack of Cognitive Coping scale, more than to any indicator of intolerance for withdrawal or for general discomfort. It is logical that people who say they can tolerate the discomfort of smoking cessation in the service of the goal ("no pain, no gain") would be more willing to attempt to quit smoking with at least 12-hour successes. Having willingness to cope with the discomfort (possibly due to better discomfort coping skills) probably makes people more willing to try to quit. The non-significance of the correlations ($|r| = .20 – .21$) of number of past quit attempts with IDQ-S Withdrawal Intolerance, the PASAT, and breath holding tasks was likely due to lower power than needed to detect the obtained effect sizes that were just below the medium level (Cohen, 1988). Given that each of these measures was related to number or length of past quit attempts in previous studies, the present non-significant results may simply reflect minor differences in level of correlation. However, comparing the magnitude of the correlations between different tolerance measures shows that Lack of Cognitive Coping accounts for considerably more variance in past quit attempts than any other measure while ASI accounts for virtually no variance. A future study could determine correlation of the Lack of Cognitive Coping scale with number of effective coping strategies the person uses and determine the ability of the IDQ-S scales to predict abstinence outcomes.

The difference between this study and previous studies in degree of correlation of the general distress intolerance measures to smoking history variables (e.g., Brown et al., 2001; Brown et al., 2002; Hajek et al., 1987; Hajek, 1991; Leyro et al., 2011; West et al., 1989) could be due to methodological differences among studies, population differences, or insufficient power. Only five smoking history variables were examined in the present study, one of which (time to first cigarette) is also one of the six items on the FTND (although scored in four categories rather than continuously on that measure). There is considerable variability in the literature about which specific smoking history variables are found to be correlated with measures of general distress tolerance, so five that were used in more than one study were chosen. However, there appears to be variability in how these smoking history variables relate to distress tolerance across studies. Finally, it could be that relationships between smoking history and distress tolerance are obscured because they are not linear.

This is the first study to investigate a related measure of ability to tolerate discomfort, the cold pressor task, for its relationship to relevant smoking variables. None of the correlations were significant. The two correlations with nearly medium effect sizes were with number and length of past quit attempts. However, while cold pressor time correlated positively with number of past 12-hour cessation attempts, as predicted, it correlated in the unhypothesized direction with length of longest past cessation attempts. In this study, at least, the cold pressor task is not consistent in its relevance to smoking cessation.

4.2 Conclusions

In conclusion, the IDQ-S shows a stronger relationship to smoking dependence, rate, and number and length of past cessation attempts than did other behavioral methods and one questionnaire measure commonly used to assess distress tolerance/intolerance. This is the first study to conduct such a direct comparison across measures. Work is underway to use the IDQ-S as a prospective predictor of success in smoking cessation, but it will not include all the other measures. Future work should also involve a comparison with the Distress Tolerance Scale (Simons & Gaher, 2005).

4.3 Limitations and Future Directions

The study was limited by using smokers not applying for smoking treatment and by investigating the constructs while people were non-abstinent. However, since reactions to other distress tolerance measures did not differ significantly in abstinent versus non-abstinent states (Brown et al., 2002), the IDQ-S is unlikely to be unaffected by abstinence or experiencing withdrawal. Only one pool of urban smokers was used; replication is needed in other populations. Using alpha of .05 is a limitation, but the main purpose was to compare level of correlations among different measures of distress intolerance rather than establish significance per se. Only one correlation would change to non-significant if we had chosen .01 as our significance level for the 30 tests but it would still be about 75% higher that the correlation of any non-IDQ measure with the same smoking variable. Despite these limitations, the smoking-specific measure of intolerance for discomfort may be more useful than the less specific measures of distress tolerance for use with smoking studies since it appears to tap a unique aspect of coping with withdrawal and other discomforts of recent abstinence that is relatively independent of other indices of distress tolerance. Furthermore, the IDQ-S may prove to be a useful and cost-effective tool for clinicians in identifying smokers who might have more difficulty during smoking abstinence, so warrants further study. A future study is needed to test whether the IDQ-S predicts smoking cessation incrementally over pre-treatment number of cigarettes per day or smoking dependence.

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Abbreviations used

ASI	Anxiety Sensitivity Inventory
FTND	Fagerström Test for Nicotine Dependence
IDQ-S	Intolerance for Discomfort Questionnaire – Smoking
M	mean
PASAT	Paced Auditory Serial Addition Task
PVAMC	Providence Veterans Affairs Medical Center
SD	standard deviation

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Highlights

- Inability to tolerate discomfort of quitting smoking can cause quitting to fail
- Tolerance for discomfort measures have not been specific to smoking abstinence
- A new measure assesses intolerance of smoking abstinence specifically
- This study compares four non-specific measures to the smoking specific one
- The smoking-specific measure was more highly related to past quit attempts
- Smoking-specific intolerance for discomfort test may be more useful for practice

Table 1

Characteristics of Participants and Scores on Intolerance Measures

	Mean (S.D.) or n (%)
Demographics	
Age	44.4 (9.4) (range 22–64)
Education	13.3 (2.7) (range 8–26)
Male	31 (52%)
White	43 (72%)
Black	10 (17%)
Hispanic	3 (5%)
American Indian or mixed race	4 (7%)
Married or living together	11 (18%)
Employed (full or part time)	20 (33%)
Smoking History, Rate and Dependence	
Cigarettes per day past week	20.0 (8.6)
FTND score	6.0 (2.1)
Years smoked regularly	25.8 (10.1)
Minutes to first cigarette of day	13.6 (38.8), median = 5.0
	25^{th} percentile = 1.0, 75^{th} percentile = 13.8
Number of times quit > 12 hours	5.6 (8.6), median = 2.5
	25^{th} percentile = 1.0, 75^{th} percentile = 6.0
Length of longest quit attempt (days)	296 (503), median = 37
	25^{th} percentile = 1, 75^{th} percentile = 341
Intolerance Measures	
IDQ-Smoking Withdrawal Intolerance	3.55 (0.75)
IDQ-Smoking Lack of Cognitive Coping	2.50 (0.63)
Anxiety Sensitivity Inventory	24.5 (13.4)
Cold pressor task duration (secs)	94.7 (100.2)
Breath holding duration (secs)	38.0 (17.6)
PASAT Completion	44 (73%)

Note: When distribution is significantly skewed, median is provided as additional information.

FTND = Fagerström Test for Nicotine Dependence total score
IDQ = Intolerance for Discomfort Questionnaire; mean agreement rating from 1–5
PASAT = Paced Auditory Serial Addition Task, Trial 3 completion

Table 2

Correlations of IDQ-S Scales with Other Measures of Intolerance for Discomfort

	IDQ-S Scale	
	Withdrawal Intolerance	**Lack of Cognitive Coping**
Other Intolerance Measures	***r***	***r***
Anxiety Sensitivity Inventory	.52**	−.10
PASAT completion (yes/no)	−.15	−.18
Breath holding (secs)	−.29*	−.20
Cold pressor task (secs)	−.14	−.06

* $p < .05$;

** $p < .001$.

PASAT = Paced Auditory Serial Addition Task

Table 3

Correlations of Intolerance for Discomfort Questionnaire-Smoking (IDQ-S) Scales and Other Measures of Intolerance for Discomfort with Smoking Dependence and History Variables

	Min to first cigarette of day [a]	**FTND total**	**# cigs/ day past week**	**# 12-hr quit attempts** [a]	**length of longest quit** [a]
IDQ-S Withdrawal Intolerance	−.45***	.48***	.26*	−.20	−.12
IDQ-S Lack of Cognitive Coping	−.23≠	.17	.16	−.33**	−.05
Anxiety Sensitivity Inventory	−.21	.10	−.05	−.02	−.05
PASAT completion (yes/no)	.13	−.13	−.05	.20	.07
Breath holding (secs)	.07	−.14	−.08	.21	−.08
Cold pressor task (secs)	−.04	−.08	−.15	.22≠	−.25≠

≠ $p < .10$;

* $p < .05$;

** $p < .01$;

*** $p < .001$.

[a] Log-transformed to correct skewness.

PASAT = Paced Auditory Serial Addition Task