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Development and initial validation of a cessation fatigue scale

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Abstract

Background—Smoking cessation fatigue, or tiredness of attempting to quit smoking, has been posited as a latent construct encompassing loss of motivation, loss of hope in cessation success, decreased self-efficacy, and exhaustion of self-control resources. Despite the potential clinical impact of characterizing cessation fatigue, there is currently no validated measure to assess it. Using a rational scale development approach, we developed a cessation fatigue measure and examined its reliability and construct validity in relation to a) smokers' experience of a recently failed quit attempt (QA) and b) readiness to engage in a subsequent QA.

Methods—Data were drawn from an online cross-sectional survey of 484 smokers who relapsed from a QA within the past 30 days.

Results—Exploratory factor analysis identified three factors within the 17-item Cessation Fatigue Scale (CFS), which we labeled: emotional exhaustion, pessimism, and devaluation. High internal consistency was observed for each factor and across the full scale. As expected, CFS overall was positively associated with withdrawal severity and difficulty quitting. CFS was negatively associated with previously validated measures of intention to quit, self-efficacy, and abstinence-related motivational engagement, even after adjusting for nicotine dependence.

Conclusions—Findings provide initial validation for a new tool to assess cessation fatigue and contribute needed information on a theory-driven component of cessation-related motivation and relapse risk.

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Contributors

All authors contributed to the design and execution of the study, analyses of data, and manuscript preparation. All authors have approved the manuscript.

Conflict of interest

None declared.

Keywords

Smoking cessation; Factor analysis; Scale development; Cross-sectional survey; Relapse

1. Introduction

Nearly two-thirds of smokers attempt to quit smoking annually (Lavinghouze et al., 2015), but the vast majority of quit attempts (QAs) end in relapse (Piasecki, 2006), even when assisted by the best available smoking cessation treatments (Cahill et al., 2014). Repeated QAs often precede long-term abstinence, indicating that most ex-smokers experienced repeated failures (Borland et al., 2012). A better understanding of processes that promote or impede renewed attempts to quit following a relapse could inform treatment development (Bold et al., 2014; Joseph et al., 2004), but few studies have addressed this important research question.

Cessation fatigue was first posited as a determinant of smoking relapse over 15 years ago (Piasecki et al., 2002). Greater cessation fatigue, or tiredness of attempting to quit smoking, was theorized to increase vulnerability to relapse, particularly late into a QA (i.e., once acute withdrawal symptoms had abated) when the cumulative cost of remaining abstinent depletes individuals' coping resources and capacity to remain quit. This latent construct was conceptualized as encompassing loss of motivation to quit, loss of hope in cessation success, reduced coping skills utilization, decreased self-efficacy, and exhaustion of self-control resources. Although several subsequent papers have referred to cessation fatigue as a possible indicator of relapse susceptibility (Lagoa et al., 2014; Piper, 2015; Simmons et al., 2010), this construct remains poorly understood.

There is the potential for significant clinical impact of characterizing cessation fatigue, yet only one study has examined it empirically. Liu et al. (2013) assessed a single-item measure of cessation fatigue ("I am tired of trying to quit smoking,"), as a predictor of relapse among smokers within a randomized clinical trial (Liu et al., 2013). Higher cessation fatigue during the first 14 days of a QA was associated with reduced likelihood of abstinence at 6-month follow-up, and was associated with greater levels of craving and negative affect. Cessation fatigue was also shown to be responsive to intervention, with significant reductions among those who received active pharmacotherapies for smoking cessation vs. placebo. Though study findings are compelling, they are limited by reliance on a single item, which failed to take into account other cognitive and emotional factors that may comprise cessation fatigue. Additionally, as cessation fatigue has been examined only among those actively undergoing a QA, its relationship with motivation to re-engage in a QA following relapse is not yet known.

Development of a comprehensive and theory-based assessment of cessation fatigue is needed in order to refine understanding of this construct in relation to cessation processes and outcomes. We previously described a workload-capacity model of treatment burden and fatigue to account for non-adherence to treatment recommendations often observed among patients with chronic health conditions (Heckman et al., 2015). In brief, this model sought to describe how demands associated with disease management, general life demands, and

resources to cope with these demands interact to influence health behaviors. Herein, we propose an adapted version of this theoretical model specific to smoking cessation (see Fig. 1). Workload is comprised of demands associated with a) quitting (e.g., withdrawal severity, cessation treatment burden) and b) general life demands (e.g., stress). Capacity refers to coping resources (e.g., social support, willpower). Cessation fatigue should emerge as workload increases or capacity decreases. As conceptualized, cessation fatigue is relevant for smokers regardless as to whether QAs are unassisted or assisted (receiving cessation treatment), they are about to quit or have recently tried, and/or their readiness to quit.

In the current study, we used a rational scale development approach to create the Cessation Fatigue Scale (CFS). In addition to examining the psychometric properties of the new measure, we examined its construct validity based on our proposed theoretical model. Specifically, we tested associations between cessation fatigue and measures of a) quit history, b) workload/capacity, and c) cessation-related outcomes. We hypothesized higher cessation fatigue would be associated with fewer lifetime QAs and shorter QA duration, greater smoking-specific (e.g., higher withdrawal severity) and general (e.g., life stress) workload factors, and reduced capacity (e.g., quitting social support, willpower). We also hypothesized cessation fatigue would be negatively associated with self-efficacy, intentions to re-engage in a QA, and current efforts towards abstinence.

2. Methods

2.1. Participants

Current smokers who had recently relapsed were recruited and surveyed online by Survey Sampling International (SSI). Eligible ($N = 484$) participants met the following criteria: (a) 18–65 years old, (b) current smoker, (c) have made an attempt to quit smoking for > 24 h that ended in relapse within the past 30 days (to minimize recall bias), and (d) smoked > 10 cigarettes per day prior to most recent QA. Relapse was defined as > 7 consecutive days of smoking or > 1 day of smoking on 2 consecutive weeks (Hughes et al., 2003). Further, all eligible participants provided survey responses that minimized risk of rote responding, as indicated by length of administration between 10 and 120 min, consistent reporting of QA history, and correct response to periodic attention items (e.g., “Enter 4 here”).

Participation was voluntary and anonymous. Following survey completion, a debriefing message was displayed and SSI provided compensation through various incentives (e.g., points to be used with online retailers, prizes or sweepstakes; cash; opportunity to donate to charity). All procedures were approved by the appropriate institutional review board.

2.2. Measures

2.2.1. Demographic and smoking history—In addition to standard sociodemographic characteristics, we assessed smoking history variables including age of onset, number and length of previous QAs, and utilization of smoking cessation treatment strategies. Nicotine dependence was assessed with the Heaviness of Smoking Index (HSI (Heatherton et al., 1989)). HSI scores were obtained for current smoking status and smoking status prior to

most recent QA. Other measures are described below; all Cronbach's Coefficient Alpha values presented are from the current study.

2.2.2. Workload measures—General perception of withdrawal severity was assessed with 7 items from the Smoking Abstinence Questionnaire-Withdrawal subscale (SAQ (Hendricks et al., 2011); $\alpha = .92$), a measure of smokers' expectancies for the abstinence process upon quitting smoking. Difficulty quitting was assessed with a single item: "How hard was it for you to quit smoking on your most recent quit attempt?" Responses options were 1 (*Easy*), 2 (*Slightly Difficult*), 3 (*Difficult*), or 4 (*Very Difficult*). Cessation treatment burden was assessed with a single item: "Think of a scale from 0 to 10, where 0 = no burden and 10 = considerable burden. During your most recent quit attempt, how would you rate the burden associated with the quit method(s) you used (e.g., time, money, functioning, social, well-being)?" Life stress was assessed with the 4-item Perceived Stress Scale (PSS (Cohen et al., 1983); $\alpha = .75$).

2.2.3. Capacity measures—General perception of quitting social support was assessed with a single item from the SAQ-Social Support subscale (Hendricks et al., 2011): "The people close to me would do everything they could to help me quit." Responses were rated on a Likert scale from 0 (*Not likely at all*) to 6 (*Extremely likely*). Willpower was assessed with two items developed to index implicit theories of willpower in relation to self-reported effects of mental exertion, specifically: a) strenuous mental activity, and b) resisting temptations (Job et al., 2010); $\alpha = .56$.

2.2.4. Cessation-Related outcome measures—Current efforts towards abstinence were assessed with the six item Abstinence-Related Motivational Engagement short-form scale (ARME (Simmons et al., 2010); $\alpha = .90$). Intent and self-efficacy to quit in the next month were assessed with a modified Contemplation Ladder in which each was rated on a 0–10 scale, with higher scores indicating greater intent and self-efficacy to quit, respectively (Biener and Abrams, 1991).

2.3. Scale development

We conducted a thorough literature review of smoking cessation fatigue which revealed several possible latent constructs (e.g., decreased hope, motivation, and self-efficacy (Piasecki et al., 2002)) and one single-item measure of cessation fatigue ("I am tired of trying to quit smoking" (Liu et al., 2013)), creating an initial pool of 23 items. We also included 12 items adapted from the HIV Treatment Regimen Fatigue Scale (Claborn et al., 2015b), a scale with similar latent constructs as hypothesized in the cessation fatigue literature (i.e., treatment cynicism and self-efficacy) and strong convergent validity. In total, 35 cessation fatigue items were examined through exploratory factor analysis. Instructions for the scale stated, "Think about how you currently feel about quitting smoking. Based on the scale provided below, please rate how much you agree with each statement." Item responses ranged from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*), some of which were reverse coded. All items were averaged to create an overall score such that higher scores indicate greater fatigue.

2.4. Analytic strategy

We used Exploratory Factor Analysis with Maximum Likelihood extraction and Promax rotation in IBM SPSS version 23 to determine the CFS's factor structure. An iterative process removed items that loaded weakly on any one factor (coefficient $< .4$ on each factor) or cross-loaded on multiple factors (coefficients $> .3$ on more than 1 factor). The Chi-Square test was used to assess overall model fit and Cronbach's alpha values were evaluated to assess internal consistency within each subscale and across the full scale. Pattern coefficients, communalities, eigenvalues, and sums of squared loadings for each factor of the CFS are reported. We then examined correlations between sample characteristics, proposed theoretical constructs, and CFS scores, using Pearson's correlation for continuous variables and one-way ANOVA tests for categorical variables. Lastly, we examined associations between CFS scores and proposed theoretical constructs in linear regression models, adjusting for nicotine dependence (HSI score), age, sex, and race/ethnicity.

3. Results

3.1. Sample characteristics

As shown in Table 1, the sample was predominantly female, middle aged, and Caucasian. Greater than high-school education was reported 69.2% of participants. Household median income fell in the \$40,000–\$49,000 range and 50.8% were employed. On average, participants reported smoking for 31.0 years ($SD = 12.8$) with a history of 6.4 lifetime QAs lasting at least 24 h ($SD = 8.5$). For the QA that immediately preceded study participation, the majority of participants reported abstinence duration of < 7 days. The majority of QAs were unaided (73.8%), while 18.2% of participants reported using Nicotine Replacement Therapy, 11% used other pharmacotherapy (e.g., Varenicline, Bupropion, Clonidine, or Nortriptyline), 4.3% used counseling or advice from a healthcare provider, and 1.7% used a Quitline. Participants reported smoking just under a pack of cigarettes per day, with nicotine dependence in the low to moderate range both before and after making a QA.

3.2. Exploratory factor analysis and psychometrics

The final scale contained 17 items, each of which loaded onto one of three factors (see Table 2). Scree plot of eigenvalues of the reduced correlation matrix showed a marked drop from the third eigenvalue to the fourth, with no appreciable difference between the fourth and fifth eigenvalue, indicating that 3 factors should be retained (Costello and Osborne, 2005). These 3 factors accounted for 57.1% of the variance, and a Chi-Square test indicated good overall model fit (value = 247.20, $p < .0001$).

Eight items loaded onto the first factor, which we considered to reflect Emotional Exhaustion ($\alpha = .86$). Five items loaded on the second factor, which captured Pessimism ($\alpha = .78$). Four items loaded on the third factor, which represented Devaluation ($\alpha = .79$). Across the full scale, internal consistency was high ($\alpha = .81$). In pairwise correlations, the Emotional Exhaustion subscale was significantly associated with the Pessimism subscale ($r = .18$; $p < .001$), but not the Devaluation subscale ($r = -.01$; $p = .76$). The Pessimism and Devaluation subscales were also positively associated ($r = .33$; $p < .001$).

3.3. Associations with sociodemographic and smoking-Related variables

Table 1 depicts correlations between CFS overall and subscale scores and relevant sociodemographic and smoking history variables. Emotional Exhaustion was negatively associated with age and years smoked, while Pessimism was positively associated with these characteristics. Sex differences were observed in which Pessimism subscale scores were higher among males while Devaluation scores were higher among females. The Pessimism subscale score was lower among those with lower level of education and income, and was higher among those who reported being unemployed and single. The CFS overall score, along with Emotional Exhaustion and Pessimism subscales, was positively associated with smoking heaviness indices (current smoking rate, pre-quit and current nicotine dependence severity) and lowest among those who reported longest and most recent QA exceeding 30 days in length. CFS overall and subscale scores were unrelated to number of lifetime QAs. Those who reported use of any evidence-based treatment during their most recent QA (i.e., pharmacotherapy, behavioral counseling, or brief advice from provider) had higher Emotional Exhaustion subscale scores and lower Pessimism and Devaluation subscale scores.

3.4. Associations with theoretical constructs

Table 3 depicts bivariate correlations between CFS scores and constructs proposed in the theoretical model; Table 4 depicts linear regression models after adjusting for nicotine dependence, age, sex, and race/ethnicity.

3.4.1. Workload—As expected, CFS overall score was positively associated with each of the four workload factors assessed: withdrawal severity, difficulty quitting, cessation treatment burden, and life stress. After adjusting for nicotine dependence and demographic factors, each of the workload factors was positively associated with CFS overall score in univariate regression models.

Patterns of association differed by subscale, with Emotional Exhaustion positively associated with all 4 workload factors, while Pessimism was positively associated with all factors except cessation treatment burden. Devaluation was negatively associated only with difficulty quitting. Results of linear regression models show that these relations were significant above and beyond the effect of nicotine dependence and demographic factors.

3.4.2. Capacity—CFS overall score as well as Pessimism and Devaluation subscales were negatively associated with quitting social support. CFS overall score, Emotional Exhaustion subscale, and Pessimism subscale were negatively associated with willpower. All relations remained significant after adjusting for nicotine dependence and demographic factors.

3.4.3. Cessation-Related outcomes—CFS overall score was negatively associated with cessation-related outcomes of intent to quit, self-efficacy, and current efforts towards abstinence (ARME). After adjusting for nicotine dependence and demographic factors, CFS overall score remained negatively associated with each of the three cessation-related outcomes in univariate regression models.

Pessimism and Devaluation subscales were negatively associated with each of the three cessation-related outcomes, while Emotional Exhaustion was negatively associated only with self-efficacy. Results were consistent before and after adjusting for nicotine dependence and demographic factors.

4. Discussion

Relapse is the predominant outcome for most quit attempts, and renewed cessation activity is needed in order to impact smoking rates at the population level. Most smokers are interested in re-engaging in a quit attempt following relapse (Joseph et al., 2004), but repeated failures are common (Partos et al., 2013). Few studies have examined theory-based and comprehensive assessments of relapse proneness and motivation to re-engage in a quit attempt. To address this gap, our study sought to develop a new assessment tool, the CFS, and examine its relations with other theory-based constructs of cessation-related motivation and relapse risk.

The CFS demonstrated good internal consistency, for both the overall scale and each of the three subscales. Our predictions regarding relations between cessation fatigue and quit history were partially supported, with the CFS negatively associated with QA duration, but unrelated to number of past QAs. Interesting initial associations with sample characteristics were observed by subscale, with both Emotional Exhaustion and Pessimism associated with nicotine dependence, while Pessimism demonstrated specific associations with sociodemographic variables (i.e., education, income, employment, and marital status). Compelling initial findings also emerged regarding relations between smoking cessation treatment utilization and cessation fatigue subfactors. Treatment utilization was positively associated with emotional exhaustion, but negatively associated with pessimism and devaluation. Perhaps smokers who seek outside treatment vs. quitting ‘cold turkey’ are more nicotine dependent, and thus more vulnerable to emotional exhaustion, but evidence-based treatment helps to buffer against negative views about quitting (e.g., by offering greater hope of cessation success). Further research is needed to examine the prospective role of treatment modality on cessation fatigue over the course of a QA.

As predicted, the CFS was related to theoretical constructs drawn from a workload-capacity model of health behaviors (Heckman et al., 2015), above and beyond nicotine dependence or demographic factors. Cessation fatigue was positively associated with workload factors related to both general life stress and cessation-specific difficulty (i.e., withdrawal severity, difficulty quitting, and treatment burden), and negatively associated with capacity to manage these workload factors (i.e., quitting social support, willpower). While several reviews have described treatment burden among those with a range of chronic medical conditions (Eton et al., 2013; Gallacher et al., 2013a; Gallacher et al., 2013b), examining the psychological impact of that burden (i.e., treatment fatigue), is a growing area of interest. This has been done primarily in the diabetes (Fritschi and Quinn, 2010; Pyatak et al., 2013) and HIV literature (Claborn et al., 2015a, 2015b; Miramontes, 2001). In both disease populations, treatment fatigue was highest among those with more intensive treatment and experience of treatment complications (e.g., side effects), and was associated with negative outcomes including emotional distress, lower quality of life, and reduced treatment adherence. As

many individuals have multiple chronic health conditions (i.e., multimorbidities (Fortin et al., 2005; Smith and O'Dowd, 2007)). Our findings add to a growing body of work on the importance of characterizing common aspects of treatment fatigue to improve disease management and adherence across conditions. Additionally, the current study demonstrates the relevance of this novel construct to the field of smoking/addiction.

As with other chronic medical conditions, nicotine dependence is best addressed through a chronic care approach (Fiore et al., 2008). Managing cessation fatigue over time may be a critical component of effective care, and aligns well with chronic care model elements of self-management support, decision support, and delivery system design (Wagner, 1998; Wagner et al., 2001). Interventions that improve self-management support by a) decreasing workload associated with a QA through effective management of stress and nicotine withdrawal, and b) increasing capacity to manage this workload, are expected to reduce levels of fatigue. Further, incorporating the CFS into ongoing assessment could help improve patient decision-making by guiding personalized feedback on areas of relative strength and weakness among the three subscales and optimal timing for re-engaging in a QA (i.e., once interventions have effectively reduced cessation fatigue). Lastly, improving the delivery system design through automatic and proactive treatment delivery can promote better treatment engagement (Heron and Smyth, 2010), while also serving to reduce burden and fatigue. For example, just-in-time adaptive interventions that use smartphones to provide “smart” prompts to use medication or coping strategies will make compliance easier and thereby improve treatment utilization, prevent or minimize the intensity of cravings/stress and lapses.

Cessation fatigue was further associated with cessation-related outcomes, such that it was negatively related to intent to quit, self-efficacy, and abstinence-related motivational engagement, even after adjusting for nicotine dependence and demographic factors. However, the direction of causality cannot be determined from this initial, cross-sectional study. Whether higher fatigue leads to decreased motivation/cessation and increased relapse, or whether relapse induces fatigue is unclear. Future research is needed to test the temporal relationship between fatigue and making a QA/relapse prospectively. If cessation fatigue is established as a prospective predictor of relapse, it may be useful to monitor fatigue throughout smokers' attempts to quit to identify those at high risk for relapse. This would provide a means to proactively mitigate relapse risk through behavioral (e.g., review coping skills, elicit greater social support) or pharmacological (e.g., increase dosage or use adjunct to existing treatment regimen) treatment strategies.

The current study was limited by use of a cross-sectional survey which relied on retrospective reporting among those who had recently relapsed. Several additional directions for future, prospective studies could help to build on these initial findings. First, it will be important to replicate findings in racially/ethnically diverse samples of smokers across the continuum of readiness to quit, as well as former smokers across a wide range of abstinence duration. Second, as noted above, longitudinal studies are needed to identify variables that may be predictive of cessation fatigue, determine whether cessation fatigue is predictive of smoking relapse, and allow for formal testing of mediation among constructs in our proposed theoretical model. In addition to theoretically related constructs, future studies

should assess variables not conceptually related to cessation fatigue (e.g., global self-efficacy, pessimism) to permit examination of discriminant validity. Third, as cessation fatigue is posited as a dynamic construct, a prospective study design would allow for examination of how cessation fatigue and sub-factors change over time, and whether any subscales are independently related to smoking variables. For example, the Emotional Exhaustion subscale was shown to be unrelated to intent to quit, which may indicate that it has potential to uniquely predict QAs and cessation outcomes, above and beyond intent to quit. Alternatively, the interaction of these two constructs may enhance the understanding of QA/relapse processes. Lastly, Pessimism and Devaluation subscales in the current CFS were comprised entirely of reverse-scored items. Further work is needed to extend assessment of these domains and validate their role as meaningful constructs in relation to fatigue and cessation outcomes.

In summary, while prior work has proposed cessation fatigue as a construct relevant to relapse proneness (Piasecki et al., 2002) and supported its association with abstinence outcomes (Liu et al., 2013), our study is the first to develop a theoretically-based, multi-dimensional, self-report measure of this construct. Further study is needed to build on this initial validation study, establish prospective relationships between theoretical constructs, and elucidate the role of cessation fatigue in real-world smoking cessation outcomes.

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Appendix A. Cessation fatigue scale and scoring procedure

Think about how you currently feel about quitting smoking. Based on the scale provided below, please rate how much you agree with each statement.

1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree.

1. I feel emotionally drained from trying to quit smoking.	1	2	3	4	5
2. The only way I would ever be able to quit smoking is if cigarettes were made illegal.	1	2	3	4	5
3. Many times it seems pointless to even try to quit smoking.	1	2	3	4	5
4. I feel hopeless about quitting smoking.	1	2	3	4	5
5(R). I am optimistic about quitting smoking.	1	2	3	4	5
6(R). Even though I may have relapsed, I know that I am getting closer to quitting smoking.	1	2	3	4	5
7(R). There are situations that I have learned I can resist smoking in.	1	2	3	4	5
8(R). I have many strategies that will help me quit smoking.	1	2	3	4	5
9(R). Quitting smoking would improve my overall quality of life.	1	2	3	4	5
10(R). Over time I have learned what does and does not work for quitting smoking.	1	2	3	4	5
11. I get discouraged when I think about trying to quit smoking.	1	2	3	4	5
12(R). The benefits of quitting smoking outweigh the costs.	1	2	3	4	5
13. Attempting to quit smoking is overwhelming.	1	2	3	4	5
14(R). Quitting smoking would make me feel good about myself as a person.	1	2	3	4	5
15(R). Quitting smoking is worth it.	1	2	3	4	5
16. Quitting smoking gets in the way of my daily life.	1	2	3	4	5

17. I am tired of trying to quit smoking.	1	2	3	4	5
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Note. R = reverse-coded items. Overall Cessation Fatigue Scale score = average of all items; Subscale scores = average of items for each factor. Emotional exhaustion: items 1, 2, 3, 4, 11, 13, 16, 17; Pessimism: items 5, 6, 7, 8, 10; Devaluation: items 9, 12, 14, 15. Higher scores indicate greater cessation fatigue.

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Fig. 1.
Proposed Workload-Capacity Model of Cessation Fatigue.

Table 1
Sample Characteristics and Bivariate Correlations with Cessation Fatigue Scores (CFS) for N = 484.

Demographics	M (SD)	Correlations with CFS		
		Overall Score	Emotional Exhaustion	Pessimism Devaluation
Age	47.4 (11.8)	.01	-.10*	.16** .06
Years smoked	31.0 (12.8)	-.02	-.12*	.15** .02
Pre-quit CPD	18.2 (9.3)	.08	.05	.09* .04
Pre-quit HSI	3.1 (1.3)	.13*	.09*	.16** -.03
Current CPD	16.0 (8.7)	.19**	.13**	.21** .03
Current HSI	2.8 (1.3)	.25**	.19**	.26** -.01
# Lifetime QA	6.4 (8.5)	-.01	.07	-.09 -.08
Demographics	N (%)	CFS Values by Group		
		Overall Score	Emotional Exhaustion	Pessimism Devaluation
Sex				
Female	283 (58.5)	2.63	3.13	2.51* 1.77*
Male	201 (41.5)	2.69	3.23	2.69* 1.64*
Race/Ethnicity				
Non-Hispanic Caucasian	443 (91.5)	2.68	3.20	2.63 1.70
African American	25 (5.2)	2.48	2.96	2.38 1.66
Other	16 (3.3)	2.62	3.21	2.46 1.64
Education				
High school	149 (30.8)	2.73	3.23	2.79** 1.65
> High school	335 (69.2)	2.64	3.17	2.54** 1.72
Income				
< \$40,000	223 (46.1)	2.67	3.14	2.72** 1.68
\$40,000	246 (50.8)	2.68	3.26	2.52** 1.72
Employment				

Demographics	M (SD)	Correlations with CFS		
		Overall Score	Emotional Exhaustion	Pessimism
Unemployed	238 (49.2)	2.67	3.15	2.69**
Employed full- or part-time	246 (50.8)	2.66	3.22	2.54**
Marital Status				
Single	204 (42.1)	2.66	3.10	2.73**
Married or member of couple	280 (57.9)	2.68	3.25	2.53**
Evidence-based treatment used for most recent QA				
Yes	127 (26.2%)	2.75	3.56**	2.38**
No	357 (73.8%)	2.64	3.05**	2.70**
Length of most recent QA				
< 7 days	314 (64.9)	2.72**	3.22**	2.74** ^a
7–30 days	111 (24.6)	2.64**	3.27**	2.38**
> 30 days	59 (10.5)	2.45** ^a	2.85** ^a	2.38**
Length of longest QA				
< 7 days	167 (34.5)	2.77**	3.27**	2.78**
7–30 days	131 (27.1)	2.78**	3.39**	2.65**
> 30 days	186 (38.4)	2.49** ^a	2.97** ^a	2.44** ^a

Note: For continuous variables, Pearson's correlation values are provided. For categorical variables, mean values are provided and between-group differences were assessed with one-way ANOVA tests. In variables with > 2 levels,

^a indicates statistically different subscale values from the other levels using least squares differences for pairwise comparisons.

HSI = Heaviness of Smoking Index. CPD = Cigarettes per day. QA = Quit Attempt.

* $p < .05$;

** $p < .01$.

Table 2

Pattern Coefficients, Communalities, Eigenvalues, and Sums of Squared Loadings for Each Factor of the Cessation Fatigue Scale.

Item	Pattern Coefficients			h ²
	Emotional Exhaustion	Pessimism	Devaluation	
1. I feel emotionally drained from trying to quit smoking.	.73	-.09	-.09	.49
2. The only way I would ever be able to quit smoking is if cigarettes were made illegal.	.56	-.14	.12	.27
3. Many times it seems pointless to even try to quit smoking.	.77	.004	.08	.56
4. I feel hopeless about quitting smoking.	.76	.08	-.16	.62
5(R). I am optimistic about quitting smoking.	.16	.59	.09	.44
6(R). Even though I may have relapsed, I know that I am getting closer to quitting smoking.	.06	.67	.14	.48
7(R). There are situations that I have learned I can resist smoking in.	.01	.44	.14	.26
8(R). I have many strategies that will help me quit smoking.	-.10	.84	-.13	.48
9(R). Quitting smoking would improve my overall quality of life.	.02	-.02	.70	.41
10(R). Over time I have learned what does and does not work for quitting smoking.	-.14	.64	.004	.34
11. I get discouraged when I think about trying to quit smoking.	.65	.13	-.13	.49
12(R). The benefits of quitting smoking outweigh the costs.	.03	.003	.58	.30
13. Attempting to quit smoking is overwhelming.	.71	.11	-.17	.54
14(R). Quitting smoking would make me feel good about myself as a person.	-.10	.13	.73	.51
15(R). Quitting smoking is worth it.	.08	.05	.76	.49
16. Quitting smoking gets in the way of my daily life.	.52	-.21	.21	.30
17. I am tired of trying to quit smoking.	.68	.02	.20	.48
Eigenvalues	4.47	3.35	1.87	
SSL	3.85	2.68	2.45	
% of Variance	25.0	20.9	11.2	

Note: h^2 = communalities; (R) = reverse coded; SSL = rotated sums of squared loadings.

Table 3

Bivariate Correlations between Cessation Fatigue Scale Scores, and Proposed Theoretical Constructs.

	Workload	Capacity					Cessation-Related Outcomes		
	Withdrawal Severity	Difficulty Quitting	Cessation Treatment Burden	Life Stress	Quitting Social Support	Willpower	ITQ	ARME	SE
Overall	.55**	.32**	.36**	.38**	-.16**	-.30**	-.33**	-.33**	-.49**
Emotional Exhaustion	.62**	.29**	.47**	.38**	.02	-.35**	-.001	.08	-.23**
Pessimism	.25**	.33**	.06	.22**	-.27**	-.12**	-.50**	-.53**	-.58**
Devaluation	-.05	-.10*	-.01	.05	-.22**	-.02	-.41**	-.53**	-.24**

Note: Associations determined by Pearson's correlation coefficients. ITQ = Intent to Quit; ARME = Abstinence-Related Motivational Engagement; SE = Self-Efficacy.

*
p < .05;

**
p < .01.

Table 4

Linear Regression of Workload and Capacity Factors, Cessation Fatigue, and Cessation-Related Outcomes.

Workload and Capacity Factors Predicting CFS						
Predictor	Domain	Variable	Outcome (β)			
			Overall Score	Emotional Exhaustion	Pessimism	Devaluation
Workload		Withdrawal severity	.53**	.61**	.21**	-.04
		Difficulty quitting	.29**	.28**	.26**	-.10*
		Cessation treatment burden	.35**	.45**	.05	-.01
		Life stress	.38**	.37**	.22**	.06
Capacity		Quitting social support	-.15**	.03	-.25**	-.22**
		Willpower	-.29**	-.34**	-.12**	.02

CFS Predicting Cessation-Related Outcomes				
Predictor	Outcome (β)			
	ITQ	ARME	SE	
Overall Score	-.30**	-.33**		-.43**
Emotional Exhaustion	.03	.07		-.20**
Pessimism	-.46**	-.53**		-.51**
Devaluation	-.41**	-.52**		-.25**

Note: Each model includes the respective variable as the sole predictor, adjusting for nicotine dependence (Heaviness of Smoking Index [HSI] score) and demographics characteristics (age, sex, and race/ethnicity). β = Standardized β -weights; ITQ = Intent to Quit; ARME = Abstinence-Related Motivational Engagement; SE = Self-Efficacy.

*
p < .05;

**
p < .01.