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Short communication

A psychometric evaluation of the Fagerström Test for Nicotine Dependence in PTSD smokers☆

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Abstract

Rates of smoking among individuals with psychiatric conditions are greater than rates seen in the general population, yet little is known about the psychometric properties of commonly used nicotine dependence instruments among psychiatric smokers. This study examined the reliability, validity, and factor structure of the Fagerström Test for Nicotine Dependence (FTND) among psychiatric smokers. Results revealed that the FTND had good test–retest reliability, convergent validity, and discriminant validity. A factor-analytic examination converged on a two-factor solution, reflecting two correlated but separate processes related to nicotine dependence. In total, the results revealed that the FTND performs as well—from a psychometric perspective—with psychiatric smokers, as it does with nonpsychiatric smokers.
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1. Introduction

The Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991) is a widely used instrument for quantifying physical dependence in smokers. Notable in the psychometric literature of the FTND is the lack of evaluations of the instrument among psychiatric smokers. Given the high rates of smoking among individuals with psychiatric diagnoses, studies that address smoking initiation, maintenance, and cessation in this population are of importance. With the exception of one small study of individuals with schizophrenia who were smokers, the psychometrics of the FTND among psychiatric smokers has been ignored. In this study, we performed psychometric tests and a factor analysis of FTND among individuals with chronic posttraumatic stress disorder (PTSD) who were also smokers.

2. Method

The data reported herein come from two sources: a study that investigated the role of smoking on affect regulation and a consecutive case series of patients presenting for services at a Veterans Affairs Medical Center PTSD Clinic.

2.1. Subjects

Subjects for sample 1 were 75 individuals over the age of 18 years. The sample was 26.3% female, 75% Caucasian (25% minority; primarily African–American), with a mean age of 47.9 years, had smoked an average of 30.1 years, had an average FTND score of 6.2, and had an average 13.6 years of education. Inclusion criteria were such that subjects meet DSM-IV criteria for PTSD and are current smokers of at least 20 cigarettes a day for at least 1 year. Subjects from sample 2 were 513 adult smokers who were seeking treatment at a Veterans Affairs Medical Center PTSD Clinic between January 1996 and May 2002. During this time period, 1509 veterans presented to the clinic. The final sample consisted of those who completed the FTND, received a PTSD diagnosis on interview, and reported being chronic smokers. The sample was mostly male (98%), 43.2% Caucasian (56.8% minority; primarily African–American), smoked for an average of 29.7 years, had an average FTND score of 4.4, a mean age of 49.5 years, and a mean education of 12.9 years.

2.2. Measures of sample 1

The FTND (Heatherton et al., 1991) was used to assess for level of nicotine dependence. Expired carbon monoxide (CO) was measured via a Vitalograph EDC 50 Carbon Monoxide Monitor. Milligrams of nicotine per day was assessed using Federal Trade Commission standards for the nicotine content of brand name cigarettes and the

self-report data of cigarettes smoked per day and brand preference (formula=mg/cigarette×cigarettes per day). The Smoking Withdrawal Questionnaire (Shiffman & Jarvik, 1976) assessed withdrawal symptoms during the deprivation period of the laboratory portion of the study. The Smoking Consequences Questionnaire—Adult (Copeland, Brandon, & Quinn, 1995) was used to assess outcome expectancies associated with smoking behavior. The Clinician-Administered PTSD Scale (CAPS; Blake et al., 1997) was used to assess for PTSD. The State–Trait Anxiety Inventory (Spielberger, Gorusch, & Lushene, 1970) was used to assess both state and trait anxiety.

2.3. Measures of sample 2

FTND was administered in a comprehensive intake assessment for treatment-seeking veterans at an outpatient PTSD clinic.

3. Procedure

For sample 1, subjects completed the FTND and all other questionnaires during the first visit to the laboratory. Upon completion of the instruments, a psychologist conducted the CAPS to assess for the presence of PTSD. Subjects meeting criteria for PTSD were scheduled for second session of the study, which occurred 1 week later. The FTND was completed on both occasions with the mean interval between sessions being 8.3 days. In sample 2, the subjects completed the FTND during a comprehensive PTSD evaluation at an outpatient PTSD clinic.

3.1. Data analyses

In order to examine test–retest reliability, we computed Pearson correlations on the FTND total scores between the first and second administration of the instrument for sample 1. For convergent validity analyses, we computed correlations of the FTND scores with aforementioned biological and psychological constructs presumed to measure nicotine dependence. We assessed discriminant validity by correlating FTND total scores with another self-report test, which presumably reflect constructs other than addiction (state and trait anxiety). Finally, we evaluated the factor structure of the FTND using data from both samples. Because the FTND has dichotomous response items, we employed methods designed to specifically handle dichotomous data (i.e., the use of tetrachoric correlation matrix; Harris, 1988). We obtained the tetrachoric correlations with PRELIS version 2. The resultant correlation matrix was subjected to a principal component factor analysis using SPSS 11.0. Because previous studies with smokers have found two-factor solutions for the FTND, we also ran the factor analysis imposing a two-factor solution with oblique rotation, allowing for correlation between the two factors (using maximum likelihood solution). The goodness-of-fit for the models was compared by way of nested chi-square tests.

4. Results

The test–retest reliability coefficient for the FTND was 0.82 (df=74; p<0.01). With respect to convergent validity, FTND total scores correlated 0.40 (df=74; p<0.01) with baseline expired CO levels, 0.38 (df=74; p<0.01) with milligrams of nicotine per day, 0.37 (df=74; p<0.05) with the Smoking Withdrawal Questionnaire, and 0.24 (df=74; p<0.05) on the craving/addiction subscale of the SCQ. The FTND did not correlate with the non-nicotine measures as assessed with the two STAI subscales (r=0.05 and 0.13; df=74; p=ns).

The initial principal component factor analysis was exploratory and arrived at a one-factor solution, which accounted for 46.19% of the variance in FTND scores. The chi-square (χ^2) goodness-of-fit test was 131.19 (df=9; p<0.05). The χ^2/df ratio was 14.58, which indicated poor model fit. In specifying the two-factor model and allowing for correlations among the two factors using oblique rotation methods, the solution accounted for 66.41% of the variance in FTND scores. The two-factor model showed improvement with a significantly smaller χ^2 (32.55; df=4). Using nested chi-square analyses, we were able to compare the two models. The change in the chi-square statistic ($\Delta\chi^2$) across the two models was statistically significant ($\Delta\chi^2$=98.64; df=5; p<0.05), indicating an improvement in model fit for the two-factor model relative to the one-factor model; the two factors correlated 0.33. Factor 1 identified items that tap "heaviness of smoking," while factor 2 tapped "morning smoking behavior." Items (1), (2), (4), and (6) loaded 0.78, 0.69, 0.63, and 0.76, respectively, on factor 1; items (3) and (5) loaded 0.55 and 0.44 on factor 2.

5. Discussion

We found that the FTND is stable based on test–retest intervals of 1 week in psychiatric smokers. With respect to the validity analyses, the FTND was correlated at statistically significant levels with biological and psychological measures of dependence. Our factor-analytic results are consistent with the notion that the FTND reflects two correlated but distinct aspects of smoking behavior. Conceptually speaking, the first factor represents primarily heaviness of smoking, while the second factor has items that exclusively tap morning smoking. This pattern is similar to that found by previous investigations of the FTND. In summary, the psychometric profile of the FTND in this study was at least as good as that found in psychometric studies of the FTND with nonpsychiatric smokers, validating use of the FTND with psychiatric smokers.

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