Psychometric properties of the Fagerstrom Test for Nicotine Dependence

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CRD summary
This review assessed the psychometric properties of the Fagerstrom Test for Nicotine Dependence. Review methods and presentation of data were weak. The conclusion that more research is needed to justify extensive use of this test is reasonable. However, the conclusion that the test is reliable in different settings and populations cannot be justified by the data.

Authors' objectives
To review the psychometric properties of the Fagerstrom Test for Nicotine Dependence, a screening tool used to assess physical nicotine dependence.

Searching
The bibliographic databases MEDLINE, LILACS, SciELO (Scientific Electronic Library Online), Web of Science and PsycINFO were searched to December 2007. Search terms were reported. Only articles published in English, Spanish or Portuguese were included. Bibliographies of identified studies were screened for additional articles.

Study selection
Studies which assessed the psychometric properties of the Fagerstrom Test for Nicotine Dependence screening tool were eligible for inclusion. Studies of reduced or modified versions of the Fagerstrom test, studies of the efficacy of treatments for nicotine dependence, and clinical and epidemiological studies of smoking-related problems were excluded.

The majority of included studies were conducted in the USA. The mean age of participants, where reported, ranged from 18 to 80 years. The proportion of male participants ranged from 33 to 100%.

The authors did not state how many reviewers performed the study selection.

Assessment of study quality
The authors did not state that they assessed study validity.

Data extraction
Data were extracted on test-retest reliability, internal consistency, the results of factorial analyses, and correlation of the Fagerstrom Test for Nicotine Dependence with other measures of nicotine dependence.

The authors did not state how data were extracted for the review, or how many reviewers performed the data extraction.

Methods of synthesis
Included studies were summarised in a narrative synthesis and tables.

Results of the review
Twenty six studies were included in the review; no details of study design were reported.

Test-retest reliability: The test-retest reliability of the Fagerstrom Test for Nicotine Dependence (FTND) was assessed in eight studies. Where reported, the test-retest interval varied between one week and 12 years, and studies were conducted in heterogeneous populations. The reported 'reliability' (no further details given) ranged from 0.65 (in a population of smokers with schizophrenia) to 0.91 (in a general population of adult smokers). No study assessed inter-rater reliability.

Internal consistency and factorial analyses: Fourteen studies assessed the internal consistency of the FTND. The
Cronbach’s α coefficient ranged from 0.55 to 0.74, indicating moderate internal consistency. The internal consistency of the FTND was found to be greater than that of the Fagerstrom tolerance questionnaire in four direct comparison studies, and less than that of eight other instruments (three studies). Twelve studies reported factorial analyses, the majority (ten studies) of which found that the FTBD measured two factors. Questions three and five of the FTND were generally considered to belong to a single factor related to the urgency to restore nicotine levels (factor 2, designated the “smoking pattern” factor); questions two, four and six were considered to be components of another factor related to the pattern of consumption (factor 1, designated the “morning pattern” factor). Findings regarding question one varied; it was considered to be part of either or both factors.

**Correlation with other measures of nicotine dependence:** One study reported the sensitivity and specificity of the FTND in a sample of patients with cancer, using the Diagnostic and Statistical Manual of Mental Disorders (Revised Third Edition) as the reference standard. The reported sensitivity of was 75% and the specificity was 80%, when a diagnostic cut-off score of five was used. Four studies reported the correlation between the FTND score and one or more biological markers. The reported correlation between the FTND score and carbon monoxide levels ranged from 0.19 to 0.59 (three studies), and the reported correlations between the FTND score and salivary cotinine were 0.24 and 0.45 (two studies). One study reported a correlation of 0.38 between the FTND score and daily nicotine intake. No details of the statistical measures of correlation used were reported.

**Authors’ conclusions**
The Fagerstrom Test for Nicotine Dependence was reliable for the assessment of nicotine dependence in different settings and populations, but further validation studies, using previously validated instruments as a comparative measure, are needed before extensive use could be justified on the basis of its psychometric qualities.

**CRD commentary**
This review reported a general assessment of the psychometric properties of the Fagerstrom Test for Nicotine Dependence and used broad inclusion criteria to identify relevant studies. The search was restricted to studies published, in full, in English, Spanish or Portuguese, which left open the possibility of language and/or publication bias. No measures to reduce the risk of error/bias in the review process were reported, and there was no assessment of the methodological quality of included studies. Therefore, it was not possible to assess the potential impact of the quality of included studies and/or the methodological rigour of the review process upon reported results.

Given the heterogeneous nature of the included studies, the narrative synthesis presented was appropriate. However, the authors frequently refereed to their review as a ‘meta-analysis’, although no formal statistical analyses were reported. In addition, details were lacking of the statistical methods (e.g. measure of correlation) used to generate the reported results of individual studies.

Overall, the authors’ conclusion that more research is needed before extensive use of the Fagerstrom test can be justified on the basis of its psychometric qualities is a reasonable representation of the data presented. However, the conclusion that the Fagerstrom test for nicotine dependence was reliable for the assessment of nicotine dependence in different settings and populations cannot be justified by the data.

**Implications of the review for practice and research**

**Practice:** The authors stated that their results indicate that the Fagerstrom Test for Nicotine Dependence is reliable for the assessment of nicotine dependence in different settings and populations, but that further studies are needed before extensive use can be justified on the basis of its psychometric qualities.

**Research:** The authors stated that further studies are needed in to assess inter-rater reliability of the Fagerstrom Test for Nicotine Dependence, to define cut-off points for different populations, and to determine its sensitivity, specificity, positive predictive value and negative predictive values. Such studies should use structured interviews, such as the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) or the Composite International Diagnostic Interview (CIDI), for comparison.
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