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## PSYCHOMETRIC PROPERTIES OF THE PAKISTANI VERSION OF THE FAGERSTROM TEST FOR NICOTINE DEPENDENCE

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### ABSTRACT

The Fagerstrom Test for Nicotine Dependency (FTND) has been widely used to assess nicotine dependence. The current study intended to investigate the psychometric properties and utility among regular cigarette users. The Fagerstrom Test for Nicotine Dependency (FTND) has been widely used to assess nicotine dependence. But there has been no evaluation of FTND psychometric properties in the context of Pakistani culture. Thus, the current study intended to investigate the psychometric properties and utility among regular cigarette users in Pakistan. The study was based on a cross-sectional survey design. Regular smokers were selected as a study sample, with the age range of 25 to 40 years. The sample was collected twice. First, for the translation purpose, a sample of 40 regular smokers was collected, and for final confirmatory validation (i.e., Confirmatory Factor Analysis [CFA]) of the translated version of the scale, a sample of 500 regular smokers was collected from different areas of Gujranwala by using a purposive sampling technique. Pearson correlation, alpha reliability analyses, and CFA were used by utilizing SPSS (version 26) and AMOS (version 10). There were significant positive correlations ( $r$  values ranging from .80 to .83) found between FTND in Urdu and FTND in English version. The alpha reliability of the scale was satisfactory (i.e., 0.76). Confirmatory Factor Analysis validated the final six items Urdu version of the scale. The translation and cross-lingual validation of the Pakistani version of the FTND scale confirmed its cross-cultural use in regular smokers in Pakistan. The study has important implications in the indigenous context of Pakistan.

*Keywords: Fagerstrom; Nicotine; FTND; Dependence; Reliability.*

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### INTRODUCTION

Tobacco consumption is considered one of the major threats and leading causes of death in both developed and developing countries of the world (Samet, 2013), accounting for over 8 million deaths annually; passive smoking causes an additional 1.2 million deaths annually (World Health Organization, 2022). Approximately 1.3 billion smokers around the world (81% of the total) reside in low- and middle-income nations. Cigarette smoking can be very addictive due to nicotine (Pogun & Arman, 2021). Pakistan ranks high among the largest nicotine-consuming countries in the world, consuming 90 000 tons of tobacco annually (Masud & Oyeboode, 2018). Tobacco is consumed in Pakistan in different forms, such as cigarettes, waterpipe (shisha/hukka), chewing of naswar, and gutka and paan (Niaz et al., 2017; John et al., 2013). The surveys on tobacco use in Pakistan are few, and most of them cover a limited, targeted population. The smoking rate in Pakistan in 2020 was 20.2% (Khan et al., 2021; Siddiqi et al., 2020).

It is difficult to break a habit once it has been established, and most people who do so relapse within six months, regardless of any treatment they may have received (Fiore & Baker, 2011; Hershman et al., 2010). FTND is a widely used test at the global level to assess the physical dependence of nicotine specific to cigarettes (Fagerstrom, 2011) because it is very simple to understand and quick to apply (De Meneses-Gaya et al., 2009). The FTND has been tested in diverse cultural settings, including Denmark, Spain, USA, Italy, Germany, Norway, Finland, Poland and Netherlands (Jhanjee & Sethi, 2010; Yamada et al., 2009; Huang et al., 2006; Uysal et al., 2015) and has shown good reliability and validity in measuring nicotine dependence. The psychometric properties of FTND have not been assessed in Pakistani culture. This study aims to translate the English version of FTND into the Pakistani Urdu version and investigate the reliability and validity of the scale among regular smokers. The aim of this study is (a) to translate the English version of the FTND into the Urdu language and (b) to validate the final version of the Urdu translated scale by using Cronbach alpha and Confirmatory Factor Analysis (CFA).

## **METHODOLOGY**

In this study, the FTND was chosen for its Urdu interpretation. It was also aimed to test the scale's cross-linguistic validity. For this purpose, a pilot study was carried out, with pretesting executed on a small number of individuals to assess the test reliability and validity of the scale. The major study was conducted in the second phase, and CFA was utilized to assess and confirm the validity of the interpreted version of the scale. We have followed the translation and back-translation procedure of (Brislin, 1970).

### **Forward Translation**

For the interpretation of the scale, permission was sought from the original author of the scale. Following that, a panel of specialists was formed, consisting of MPhil scholars, two from the departments of English and Urdu and one from the department of Psychology, and they were requested to interpret the FTND into Urdu. A master panel of experts was also formed for the committee approach consisting of five experts holding PhD in Clinical Psychology. The master panel aimed to finalize the Urdu interpretation of the scale after a thorough evaluation. After their recommendations, the final draft of the translated scale was compiled for backward translation.

### **Backward Translation**

For backward translation, again, two panels of experts were assembled. One panel was comprised of five bilingual experts holding a PhD degree. For this panel, two experts, each from the department of Psychology and the department of English, and only one expert from the department of Urdu were selected. All these members of the panels were unfamiliar with the initial version of the scale, so they were asked to translate the scale again into English from its Urdu translation. The second panel of experts was made for the committee approach, comprised of five experts holding a degree of PhD in Clinical Psychology. The purpose of this panel of experts was to finalize the English interpretation of the scale by contrasting the original version and the first translated version of the scale. Modifications suggested by the panel were incorporated into the scale. Finally, after the panel feedback, the most appropriately interpreted items were incorporated into the Urdu version of the FTND.

### **Sample**

A sample of 40 regular smokers ranging in age from 25 to 40 years old was chosen for cross-language validation. The sample size was sufficient because there were only six items, and it is recommended by Anthoine et al. (2014). The age range of 25 to 40 years was selected because, in Pakistan, most drug/nicotine addictions happen in this age range (Shujaat et al., 2022). The sample was collected from

regular smokers residing in various locations in Gujranwala. The sample was split into two equal portions (groups 1 and 2). Group 1 received the original English version scales, whereas Group 2 received translated Urdu version scales. After 15 days, the scales were re-administered to the same subjects in a revised format. This time, group 1 was subdivided into groups 1a (n=10) and 1b (n=10), as well as groups 2a (n=10) and 2b (n=10). Groups 1a and 2a received the original English version of the scale, whereas groups 1b and 2b received the Urdu version. Pearson correlation analysis was done to validate the measure across languages. Only male participants were included because most of the nicotine-addicted and tobacco-user participants in Pakistan were males.

Finally, for applying CFA to confirm the translated scale on the final translated version, a sample of the FTND and 500 smokers were collected from different areas of Gujranwala. Based on Kline's (2011) data collection procedure, the sample was sufficient and representative. A purposive sampling technique was used for sample collection. In using CFA for validations, model fit indicators were used to test the validation of the final scale. CFA is a statistical technique used to verify the factor structure of a set of observed variables of our data. CFA allowed us to test the objective that a relationship between observed variables and their underlying latent constructs exists. In our data, only one factor has been observed with six items. A path model was developed in which all items explained individual levels of variance and estimates of effect sizes. The collected data were analyzed by using SPSS (Version-26) and AMOS (Version-10).

### **Procedure**

Data were collected from regular smokers by utilizing purposive sampling. These participants were selected from different areas of Gujranwala. Participants participated in this study voluntarily. Before their participation, the purpose, along with the brief introduction of the study, was explained. They were assured that their confidentiality would be maintained. All study participants provided their written consent. Afterwards, the questionnaires were given to the participants. They were asked to read and understand the guidelines thoroughly. After getting a hold of it, they were asked to register their responses against each item as accurately as possible. Finally, after cleaning the data, statistical software was used to examine the acquired data.

### **Instrument**

The English and Urdu versions of the FTND were utilized to assess their psychometric properties (Heatherton et al., 1991). The response options of different items of scale vary. For item 1, response options are 1 for "within 5 minutes", 2 for "6 - 30 minutes", 3 for "31 - 60 minutes", and 4 for "after 60 minutes". For item 2, response options are 1 for "yes" and 2 for "no". For item 3, response options are 1 for "the first one in the morning" and 2 for "any other". For item 4, response options are 1 for "10 or less", 2 for "11-20", 3 for "21-30", and 4 for "31 or more". For item 5, response options are 1 for "yes" and 2 for "no". For item 6, response options are 1 for "yes" and 2 for "no". Scores range from 0 to 10. Each item is rated on a different scale depending on the nature of the question. The items are added to generate a score ranging from 0 to 10. The FTND yields 1 primary scale, and the cut off score is based on highly dependent (> 6) from less dependent (<5) smokers (Fagerstrom et al., 1996; Ferguson et al., 2003). The reliability of the originally developed version of the scale was 0.51.

### **RESULTS AND DISCUSSION**

Table 1 demonstrates a substantial positive correlation (\*\* $p < .01$ ) between the FTND in Urdu and the FTND in English versions. The correlation coefficient ranges from .80 to .83.

Table 1. Cross-Language Validation and Test-Retest Reliability of the FTND (N = 40).

Groups	1 <sup>st</sup> Administration	2 <sup>nd</sup> Administration	r
I	English	English	.83**
II	English	Urdu	.81**
III	Urdu	Urdu	.82**
IV	Urdu	English	.80**

\*\*p<.01

Table 2. Descriptive Statistics, Reliability, and Estimates of Effect Sizes on all Items of Translated Version of the Scale in Confirmatory Factor Analysis (N = 500).

Items	Estimates	SE	CR	p	Label	M	SD	Range	$\alpha$
FTND1	.35	.01	8.46	***	par_1	2.51	1.26	1-4	.76
FTND2	.72	.05	22.94	***	par_2	2.19	.66	1-3	
FTND3	.68	.07	20.43	***	par_3	2.04	.81	1-3	
FTND4	.64	.01	18.35	***	par_4	2.57	1.25	1-4	
FTND5	.87	.05	38.38	***	par_5	2.57	.95	1-4	
FTND6	.94	.04	59.55	***	par_6	2.73	.92	1-4	

\*\*\*p<.001

Table 2 shows descriptive statistics, reliability, and estimates of effect sizes on all items of the translated version of the scale in confirmatory factor analysis. It was shown that all items have higher effect sizes (i.e., > .34) and therefore are satisfactory items loading. The reliability was also satisfactory, and the scale was internally consistent.

Table 3. Model Fit Summary of the Modified Model in Confirmatory Factor Analysis (N = 500).

Model	AIC	BCC	NPAR	CMIN
Modified model	2199.82	2200.47	20	2159.82

Table 3 demonstrates the model fit summary, indicating that the saturated model was not fitted to the data of at least one group due to varied response options in different items of the scale. As a result, only the 'log-likelihood function,' AIC, and BCC are presented. The likelihood ratio, chi-square statistic, and other metrics of fit are not reported. The overall model suggested that the model fit indices were adequate.

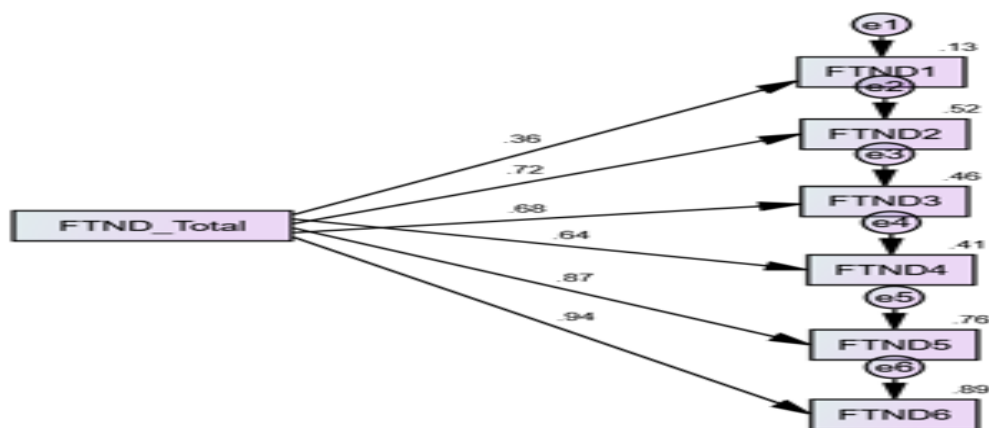


Figure 1. Estimates of Effect Sizes of Each Item in CFA (N = 500).

In the above model, all items explained satisfactory estimates of effect sizes. The minimum estimate of effect size is .36, and the maximum is .94, which confirms the item-wise scale validation of the translated version of the scale. The individual-level variances on all items were also satisfactory.

Table 4. English and Urdu Version of Fagerström Test for Nicotine Dependence.

Items	English Version	Urdu Version
1	How soon do you smoke your first cigarette after you wake up? Within 5 minutes 31 to 60 minutes 6 to 30 minutes After 60 minutes	آپ جاگنے کے بعد کتنی جلدی اپنا پہلا سگریٹ پیتے ہیں؟ 5 منٹ کے اندر 6 سے 30 منٹ 31 سے 60 منٹ 60 منٹ کے بعد
2	Do you find it difficult to avoid smoking in places where it is prohibited (e.g., in church, at the library, or in the cinema)? Yes/No	کیا آپ کو سگریٹ پینے سے گریز کرنے میں مشکل پیش آتی ہے؟ جن جگہوں پر سگریٹ پینا ممنوع ہے۔ (مثلاً، چرچ/عبادتگاہ میں، لائبریری میں، سینما میں) ہاں نا
3	Which cigarette would you dislike the most to give up? The first one in the morning Any other	آپ کو کون سا سگریٹ چھوڑنا انتہائی ناگوار لگے گا۔ صبح میں پہلے والا کوئی بھی اور
4	How many cigarettes do you smoke in one day? 10 or less 11 to 20 21-30 31 or more	آپ ایک دن میں کتنے سگریٹ پیتے ہیں؟ 10 یا کم 11 سے 20 21 سے 30 31 یا زیادہ
5	As compared to the rest of the day, do you smoke more often during the first hours after waking? Yes/No	کیا آپ دن کے باقی حصے کے مقابلے میں جاگنے کے پہلے گھنٹوں میں کثرت سے سگریٹ پیتے ہیں؟ ہاں نا
6	Do you smoke when you are so sick that you are in bed most of the day? Yes/No	کیا آپ سگریٹ پیتے ہیں، جب آپ اتنے بیمار ہوں کہ آپ دن کے زیادہ تر حصہ بستر پر ہوں؟ ہاں نا

## Discussion

The FTND of physical dependence on nicotine. The test was designed to provide an ordinal assessment of nicotine addiction in relation to cigarette smoking. The translation of an instrument is fairly prevalent in cross-cultural research (Riaz & Rafique, 2019; Sousa & Rojjanasrirat, 2011). A committee of specialists is assembled in the translation process to translate research tools or scales from the source language to the

target language (Efstathiou, 2019), emphasizing theme translation in local languages and setting aside the literal translation of a questionnaire (Santos et al., 2016; Feiz et al., 2013). When translating scales from one language to another, Flaherty and his fellows provided guidelines to assure five equivalences (text, linguistic, technical, criteria, and theoretical equality) (Flaherty et al., 1988).

The current study was based on the translation and cross-language validation of the English version of the FTND. The translation and cross-language validation of the scale was satisfactory. The Cronbach alpha reliability of the scale was .74. However, Cronbach alpha reliability of the original English version scale was .51 (i.e., Heatherton et al., 1991), which was very low (De Meneses-Gaya et al., 2009). The disparities in reliabilities between the English and Urdu versions may be attributable to cultural variances between samples of two distinct societies. Because Pakistan is a collectivistic culture, the original English version scale was based on a sample of individualistic culture (Krys et al., 2019).

When an instrument was translated, it could not be used unless it was cross-validated. Validity in terms of content should be ensured. Questionnaires that have been translated should be subjected to further psychometric evaluation (Kozanhan & Yildiz, 2021). Following these guidelines, it was mandatory to validate the translated version of FTND. As a result, after examining the scale's translation, the scale's validity was evaluated by using CFA. The path analysis revealed that the final translated Urdu version of the scale required item-by-item validation. Finally, the translation and cross-language validation of the FTND was found to be adequate. Future research is needed to investigate the impact of nicotine dependence in diverse populations, i.e., working women, athletes, etc. (Akhtar et al., 2022; Shakir et al., 2021).

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