

THE FACTOR STRUCTURE OF THE ARABIC VERSION OF THE SELF-ADMINISTERED NICOTINE-DEPENDENCE SCALE

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An empirical survey was undertaken to investigate the factor structure of the Arabic version of the Self-Administered Nicotine-Dependence Scale (SANDS), on a sample of 338 Kuwait University undergraduate students (males 173 and females 165). Two factors were obtained by principal axis factor analysis from the Arabic SANDS. These were termed Personal and Social Skills Deficit, and Personal and Social Attitudes Support for smoking. It was concluded that these factors were interpretable with an adequate internal consistency, ranging from .70 to .77, with a gender difference observed in the two factors, with females sharing a higher mean factor score than males. Based on these findings, the Arabic SANDS can be recommended for use among Arab college students.

Extensive literature on smoking initiation and experimentation among college students abounds, yet little research has been carried out on nicotine dependence among this group. Studies on the natural history of nicotine dependence among adults suggest dependency to be the final stage in a multistep evolution of smoking in a society where smoking behavior symbolizes a pharmacologically motivated behavioral pattern, suggestive of a strong negative reinforcement (withdrawal relief).

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Nicotine may induce perceptible pharmacologic effects in adults, such as pleasure, relaxation, stress relief, mood, and body weight regulation. Regular smokers become dependent on nicotine, so much so that inability to smoke induces physical withdrawal symptoms. Studies from the UK and the USA further corroborate the dependency syndrome, and reveal that young adults experience both pharmacologic effects of nicotine from cigarette smoking, and withdrawal symptoms when they are unable to smoke cigarettes (Colby, Tiffany, Shiffman, & Niaura, 2000). However, research on college students' nicotine dependence has suffered from the absence of requisite definition and assessment of nicotine addiction among this age group (Colby, et al., 2000).

In reviewing the available literature on nicotine dependence measures, the first standardized scale for assessing nicotine dependence was reportedly the Fagerstrom Tolerance Questionnaire (FTQ; Fagerstrom, 1978). This questionnaire is an eight-item paper-and-pencil instrument, specifically designed to assess the degree of physical (physiological) dependence on nicotine, and includes items on the principle of addiction, and known pharmacological characteristics of nicotine. Several studies support the validity and clinical utility of the FTQ (Fagerstrom & Schneider, 1989; Pomerleau, Majchrzak, & Pomerleau, 1989), with hardly any negative findings (Lombardo, Hughes, & Fross, 1988), though some other studies did point out associated psychometric problems (Lichtenstein & Mermelstein, 1986; Pomerleau, Pomerleau, Majchrzak, Kloska, & Mulakuti, 1990; Swan, Ward, & Jack, 1991), due to problematic internal consistency (Lichtenstein & Mermelstein, 1986). This later led to a new and improved version of the questionnaire (FTND) providing better reliability (Pomerleau, Carton, Lutzke, Flessland, & Pomerleau, 1994), with greater emphasis being placed on the number of cigarettes smoked per day. However, this version too fell short of the psychometric mark for clinical utility, with low internal consistency for clinical applications, necessitating the development of a new measuring scale (Davis et al., 1994).

Our study, on the other hand, is based on the Self-Administered Nicotine-Dependence Scale (SANDS), for assessing nicotine dependency among the study population, through a 32-item dichotomous (Yes-No) questionnaire, specifically evolved for the purpose, with two nonoverlapping subscales of 16 items each. The scale includes six domains (1) self-efficacy; (2) social skills deficit; (3) loss of control; (4) consequences of use; (5) social support for smoking; and (6) concern for healthy lifestyle. These domains crucially signify our previous clinical experience, prior research, and present theorizing, with some domains having their origin in the field of alcohol and drug addiction, and others arising from work on nicotine withdrawal and smoking cessation. (with a yes/no response format). Thus, the concept of *Self-Efficacy* (SE) is derived from the work of Bandura (1977) which, simply stated, concerns *expectations of personal*

efficacy determining whether coping behavior will be initiated, how much effort will be expended, and how long it will be sustained” (p. 191). These expectations of personal efficacy are differentiated from outcome expectancies in that the former involve personal conviction of success in performing the required behavior, and the latter do not necessarily involve this conviction of successful accomplishment. Several studies (Conditte & Lichtenstein, 1981; DiClemente, 1981; Prochaska, Crimi, Lapsanski, Martel, & Reid, 1982) have applied self-efficacy principles to smoking behavior and relapse to smoking after cessation, and studies generally support self-efficacy theory, providing us with the requisite basis to include self-efficacy items – 13 in all – in our questionnaire. However, to ensure its consistency with other domains, our concern was to measure low self-efficacy, as a high score on items from this domain may have predictive problems in treatment, a higher potential for relapse, and the need for more intensive treatment modalities.

The Social Skills Deficit (SSD) concept also emanated from our clinical experience, essentially from the notion that smoking is perceived as facilitating personal social functioning. For example, an aura of maturity and sophistication may accrue to the teenager who smokes, or adults may perceive that cigarette smoking gives them something to do with their hands. This view suggests that nicotine-dependence treatment programs should provide training in responding to social cues and situations with new, nonsmoking social behavior; hence this domain included 15 items. The loss of control domain, however, is central to the definition of drug dependence or addiction, and is characterized by the inability to cut down or stop using the substance of choice or by the unpredictability of knowing what quantity will be consumed, once its use has begun. This concept has proven sufficiently fruitful in diagnosing and treating such disorders, necessitating its inclusion in our questionnaire for smoking treatment assignment, and there were 15 items on this domain. The domain of Consequences of Use (COU) is similar to loss of control by way of its importance in the field of substance-abuse, and refers to social or occupational functioning impairment, due to substance use. Most current diagnostic schemes of substance-use disorders include the consequences of use as criteria for the presence of the disorder. With smoking, the health consequences are generally well known, and social consequences are increasingly encountered, such as separate seating in restaurants, prohibition or separation on airplanes and nonsmoking rooms in hotels, with increasing restrictions on smoking in public and private buildings. This domain was represented by 12 items.

The domain of Social Support for Smoking (SSS) is largely based on our clinical observations in the field of substance-abuse treatment, which led to the conclusion that relapse is related closely to the existence of a social system that strongly supports substance use. It is our assumption that if the smoker's social

support system condones smoking, the ability to initiate and sustain smoking cessation will be reduced, and hence the domain included 11 items that inquire into the attitudes of the respondent's support system. Finally, Concern for Healthy Life-style (HL) is the domain that samples a patient's attitude toward healthy behavior. Preventive medicine and behavioral medicine are interlocking disciplines that stress the need to develop healthy lifestyles, for example, the treatment of hypertension may involve appropriate medication, but it also may involve learning better techniques of stress management, proper diet and sleep patterns, and a suitable exercise program. Thus, the treatment of many chronic diseases and potentially disabling symptoms may involve a modification of significant aspects of a person's lifestyle. Similarly, smoking cessation involves many lifestyle changes in addition to not smoking. For this reason, specific items were included that probe attitudes and behaviors related to health and life-style. As in the case of the self-efficacy component, the scoring direction for this component was reversed so that a high score on items from this domain suggests a lack of interest or concern about health and, consequently, poorer outcome or a need for more intensive forms of treatment. This domain included 13 items.

Logistic regression analyses of an additional sample of subjects indicated that the SANDS added predictive power to knowledge of sex and transdermal-patch status, and is predictive of smoking behavior 6 months later, however, its reliability and validity needed to be improved. Furthermore, Jean-Francois, Jacques and Thomas (2003) developed a new self-administered measure of cigarette dependence, through an explicit Cigarette Dependence Scale (CDS-12), generated on the basis of qualitative surveys. A comprehensive later version (114 items), tested on the internet on 3009 smokers, covered the main components of the DSM-IV and ICD-10 definitions of dependence: compulsion, withdrawal symptoms, loss of control, time allocation, neglect of other activities, and persistence despite harm. CDS-S has similar measurement properties, but a less comprehensive contextual basis. Both scales had high test-retest reliability ($r_{\geq} = 0.83$), and a high internal consistency (Cronbach's $\alpha = 0.84$). In this regard, CD-12 and CDS-5 are reliable measures of cigarette dependence, fulfilling several criteria of content validity, with a sensitivity to change over time.

The present study aimed at examining the factor structure of the Arabic version of the nicotine dependent self-administered scale among Kuwaiti undergraduate students. The selection of the scale was based on account of its versatility in determining the following:

The need for reviewing and refining six subscales (loss of control, consequences of use, social skills deficit, self-efficacy, social support for smoking, and concern for healthy lifestyle), representing the original version by factor analysis (SAND), for further refinement in terms of psychometric properties, especially as there is no Arabic study that examines such psychometric properties in Arab countries.

We believe that nicotine dependency is a global phenomenon, and hence can be examined in any culture; this was the prime reason for us to select Kuwaiti undergraduate males as the target population, another reason being the high prevalence rate of cigarette smoking (42.2%), as per the researcher's latest study (Alansari, in press). Also, on the basis of our review of literature, we did not find any psychometric properties of such a scale.

METHOD

SUBJECTS

The study was conducted among 338 smokers, undergraduate students of Kuwait University, selected from a pool of 900 subjects. There were 173 males and 165 females, in the age range of 18-25 years. They received additional credit for their participation in the experimental study on personality.

SCALE

The Arabic version of the Self-Administered Nicotine-Dependence Scale (SANDS) was used. The scale, in its preliminary form, consisted of 79 items, eliciting a "Yes" or "No" response. The content of the items was derived from the six subscales described above.

PROCEDURE

The Self-administered Nicotine-Dependence Scale, including 79 items, was administered to the 900 students in a classroom setting, and took about 20 minutes to complete, along with a personal sheet. The scale was distributed randomly to all students (smokers and nonsmokers), from among whom the positive responses were picked, with the discarding of those which were nonsmokers, both males and females.

DATA ANALYSIS

The data were analyzed using SPSS V.11, run on miniframe. Correlation factor analysis and a *t*-test were performed.

RESULTS AND DISCUSSION

The six subscales were factorally analyzed by Hotelling's principal component method (Gosuch, 1983). Three criteria were applied in determining the number of accepted factors:

- (1) Salient loading of 0.45 or more, according to Overall and Klett's (1972) criterion,

- (2) Minimum of three items loading with a significant saturation on each component,
- (3) Kaiser-Guttman retention criterion of eigenvalue greater than 1.0. The obtained factors were subjected to the Kaiser Varimax (Gosuch, 1983) orthogonal rotation method for interpretability of the components.

The analysis derived by orthogonal rotation extracts two factors, accounting for 64.97% of total variance. Table 1 presents the factor loading of two factors, revealing three subscales (consequences of use, social skills deficit and loss of control) significantly loading on factor one.

TABLE 1
VARIMAX (KAISER) FACTORS OF THE ARABIC NICOTINE DEPENDENCE SUBSCALES

Subscales	No. of Items	F1	F2	h2
		Personal and social skills deficit	Personal and social attitudes supporting smoking	
Consequences of use	12	.83		.69
Social skills deficit	15	.80		.64
Loss of control	16	.79		.68
Concern for healthy lifestyle	12		.87	.78
Self - efficacy	13		.69	.66
Social support for smoking	11		.63	.46
Eigenvalue		2.61	1.29	
% Variance		43.49	21.48	
Total variance			%64.97	

The loading of these subscales on one factor is attributable to the presumption of the possible existence of a general factor, encompassing all subscales, which can be nominated by the Personal and Social Skills Deficit, and which accounted for 43.49% of the total variance.

The second extracted factor (size-wise), identifiable by Personal and Social Attitudes Supporting Smoking, accounted for 21.48% of the total variance. It comprised three subscales (Concern for Healthy Lifestyle, Self-efficacy and Social Support Smoking).

Table 2 presents the reliability of factors, calculated on the basis of two methods of internal consistency - Cronbach's alpha and split-half - for males and females. The Arabic SANDS was found to have acceptable internal consistency (range 0.70-0.77).

Table 3 presents a *t*-test comparison of factor means between males and females, significantly revealing females with higher scores in both factors than

males. In general, the factor structure of the Arabic SANDS obtained in our study did not produce an identical pattern of factors, as obtained by Davis et al. (1994).

TABLE 2
FACTORS INTERNAL CONSISTENCY DERIVED FROM THE ARABIC SANDS

Factors	N	M	SD	Reliability Coefficient	
				Alpha	Spearman - Brown Split - Half
F1 Personal and social skills deficit	338	18.10	4.31	.75	.76
F2 Personal and social attitudes supporting smoking	338	11.32	2.73	.70	.77

TABLE 3
GENDER DIFFERENCES IN THE ARABIC SANDS FACTORS

Factors	Males (n=173)		Females (n=165)		T Value	P Level
	M	SD	M	SD		
F1 Personal and social skills deficit	14.42	3.99	21.77	4.63	15.60	.001
F2 Personal and social attitudes supporting smoking	9.24	1.98	13.40	3.47	13.46	.001

However, the results of the present factor analysis study conducted on the Scale among the sample of Kuwait University students did reveal two meaningful interpretable factors. The item-loading pattern on factors demonstrated high clarity in factor structure, facilitating the interpretation of extracted factors. These findings suggest that the Arabic SANDS scale merits recommendation on the basis of its effective applicability to Kuwaiti college students populations, as well as to compatible groups.

In summary, the SANDS consists of two subscales derived from factor analysis of the SANDS items, with an adequate internal consistency, however – being preliminary – these results are yet to be cross-validated across different samples. Also, our analysis may have inadvertently taken advantage of chance properties of our sample, and thus may not replicate well.

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