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Research Article

A Review of Nicotine Dependence Measures

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Abstract

Background and Purpose: Progress in tobacco dependence research relies on improved nicotine dependence measurement. This study aimed to review and evaluate nicotine dependence measures.

Methods: PubMed, Google Scholar, EBSCO, CINAHL, and Ovid Journal databases were searched, and 12 articles (5 of them are seminal articles) and one book were identified and reviewed.

Results: Two main groups of measures have been developed to assess nicotine dependence: unidimensional measures (focus on one dimension) and multidimensional measures (cover many dimensions). Nicotine dependence measures differ based on various criteria, and there is no ideal measure.

Conclusion: It is important to select the instrument that has appropriate psychometric properties, is suitable for the target population, and reflects the conceptual definition for the construct in which the researcher is interested.

Keywords: *Nicotine; Tobacco; Dependence; Scales; Measures; Instruments; Assessment*

Background

Nicotine dependence is still the leading preventable cause of disease, disability, and death among smokers. Nicotine dependence has been causally associated with respiratory disorders, cardiac diseases, cancer, and other chronic disorders [1-4].

Several researchers and clinicians have become interested in the concept of nicotine dependence as a hypothetical construct that has been created to explain and predict smoking associated problems, such as an inability to quit smoking, heavy use, withdrawal and relapse [5-10]. Development in nicotine dependence research relies on improved measurement [6]. Ideally, a good measure should reflect how the construct is defined [11].

This study aims to review and evaluate the most common nicotine dependence measures based on various criteria (e.g. reliability, validity, collection procedure, scoring and interpretation, administration, theoretical definition, and operational definition). The nicotine dependence measures included in this study are: Fagerström Test Nicotine Dependence (FTND) [12], the Diagnostic and Statistical Manual of Mental Disorders (DSM) [13]. Tobacco Dependence Screener (TDS) [14], Cigarette Dependence Scale (CDS) [15], Nicotine Dependence Syndrome Scale (NDSS) [16] and Wisconsin Inventory of Smoking Dependence Motives (WISDM-68) [17].

Methods

Search strategy and data sources

A comprehensive search was conducted using PubMed, Google Scholar, EBSCO, CINAHL, and Ovid Journal databases. The online search process was carried out using general terms, such as "nicotine", "tobacco", "dependence", "addiction", "scales", "measures", "assessment" and "instruments".

Inclusion criteria

Articles were eligible for inclusion if they were published in the English language, reported a nicotine dependence measure, and discussed the psychometric properties of that measure. Searching process primarily focused on finding seminal articles and then finding studies used or discussed nicotine dependence measure.

Results

Review of published studies

Based on the inclusion criteria, 12 articles (5 of them were seminal articles) and one book were identified and reviewed.

Overall evaluation of nicotine dependence measures

Two main groups of measures have been developed to assess nicotine dependence: traditional (unidimensional) measures and multidimensional measures. The unidimensional measures assess dependence as one dimension, whereas the multidimensional measures provide information about the mechanisms underlying nicotine dependence.

The unidimensional measures, such as FTND, DSM, TDS, and CDS, assess the endpoint definition of nicotine dependence (e.g. heavy smoking, time to first cigarette in the morning, and smoking despite consequences), rather than the mechanism of dependence [18]. For instance, the FTND was designed to measure the construct of physical dependence [12], whereas the DSM criteria of nicotine dependence were designed to assess a cluster of cognitive, behavioral, and physiological symptoms of nicotine dependence [18].

Although these unidimensional measures provide relatively little insight into the nature or mechanisms of dependence, they have revealed efficiency in predicting clinically important dependence criteria, such as smoking heaviness and relapse [18]. These measures are efficient because they have significant validity given their length and response burden [18]. Moreover, data from latent class analysis suggest that particular items from these measures possess predictive validities that meet or exceed those of the multidimensional measures [19]. Such items could be efficient for epidemiologic research.

On the contrary, the multidimensional measures of nicotine dependence, such as the NDSS and the WISDM, have been developed to better understand potential theories and mechanisms underlying nicotine dependence, which, in turn, could be used to improve treatment modalities and research [18]. Despite their length and reduced efficiency, multidimensional measures are usually used because they have the potential to provide information about the mechanism underlying nicotine dependence not supplied by unidimensional measures. In addition, multidimensional measures may assess particular aspects of dependence or dependence processes, such as motives for nicotine use, not assessed by unidimensional measures [6]. Hence, these measures may provide greater insights into the concept of nicotine dependence than do unidimensional measures.

Fagerström test nicotine dependence (FTND)

FTND is a 6-item measure that conceptualizes dependence through physiological and behavioral symptoms [12]. Although FTND has moderate internal consistency ($\alpha = .61$), it is the most widely used instrument for assessing nicotine dependence [6].

FTND contains the following items: i. "how soon after you wake up you smoke your first cigarette" [0-3 points]; ii. "Do you find it difficult to refrain from smoking in places where it is forbidden?" [0-1 points]; iii. "Which cigarette would you hate most to give up?" [0-1 points]; iv. "How many cigarettes per day do you smoke?" [0-3 points]; v. "Do you smoke more during the first hours after waking than during the rest of the day?" [0-1 points]; vi. "Do you smoke even when you are ill enough to be in bed most of the day?" [0-1 points]. A total score for nicotine dependence (FTND) were obtained by summing above given points where minimum = 0 and maximum score = 10 [12].

DSM criteria for nicotine dependence

DSM is a common nicotine dependence measure, especially for the purpose of clinical diagnosis and epidemiology research. This measure views nicotine dependence as a cluster of cognitive, behavioral, and physiological symptoms, indicating tolerance, withdrawal, and compulsive smoking behavior [13] With this instrument, nicotine dependence is assessed through an interview of an extensive list of 40 symptom questions that are designed to assess DSM criteria for nicotine dependence. Nicotine dependence diagnose requires smokers to have at least 3 of the 7 DSM criteria of nicotine dependence [13].

Although DSM is a helpful diagnostic tool, it provides little insight into the mechanism of nicotine dependence. Hence, it is more appropriate for descriptive and clinical research, rather than smoking mechanism or theoretical research [6]. In addition, despite its face validity, this instrument has little evidence supporting its convergent validity [6].

Tobacco dependence screener (TDS)

TDS is a self-report measure developed to assess 10 DSM tobacco dependence criteria. The Cronbach's alpha coefficients for the TDS ranged from .74 to .81, indicating a good internal consistency [20]. This scale revealed acceptable construct validity, predictive validity, and screening performance based on psychiatric diagnosis criteria. Compared with the FTND, the TDS has a better screening performance than do the criteria of the DSM [20]. Despite the dichotomous structure of this scale, it is useful for case-finding and epidemiological studies, but not theoretical and mechanism research [6].

These are two types of this scale, the CDS-12 and the CDS-5; each one is rated using a 5-point scale. The CDS-12 is a 12-item instrument covering the main components of the DSM and ICD-10 and some of the FTND, whereas the CDS-5 is a 5-item version of the CDS-12 [15]. These items were developed to assess the dependence outcome, such as addiction rate on a scale of 0 to 10 and number of cigarettes per day [15]. The internal consistency coefficients were .90(α) for CDS-12 and .84(α) for CDS-5, indicating a good reliability. This scale revealed a good construct and predictive validity [15]. Overall, this scale is effective for use in clinical research because of its high reliability and validity [11].

Nicotine dependence syndrome scale (NDSS)

NDSS is a 19-item self-report measure covering five theoretical derived factors: Drive, Priority, Tolerance, Continuity, and Stereotypy. These factors, in turn, reflect various dimension of dependence, enabling NDSS to assess nicotine dependence syndrome better than the unidimensional measures that assess only one dimension [15].

Despite that the reliability of some subscales is relatively low; the Cronbach's alpha for total scale is .85, indicating a good reliability [16]. The correlation between NDSS measure and other measures, such as the FTND and the DSM criteria, was also evaluated. The results showed a significant correlation, reflecting a convergent validity [16]. Although NDSS provides insight into the multidimensional nature of nicotine dependence, unidimensional measures are still more focused. Hence, some researcher prefer to use it to supplement, rather than supplant the unidimensional measures [6].

The Wisconsin inventory of smoking dependence motives (WISDM-68)

WISDM-68 is 68-item self-report measure, assessing 13 theoretical-derived motivational domains on a 7-point Likert scale ranging from 1- "Not true of me at all" to 7- "extremely true of me". This multidimensional scale was designed to assess the process that leads to dependence [17].

The WISDM scales revealed good psychometric properties for the measurement of smoking motives and were related to some indices of nicotine dependence [17]. The internal consistency coefficient of each subscale was greater than .80, demonstrating a good reliability. The convergent validity revealed that WISDM correlated with FTND and TDs [17]. However, more research is needed to support its validity, and some subscales revealed redundancy with other subscales [6]. Overall, the theoretical basis of this scale and its length make it more appropriate for theoretical research, rather than clinical research [6].

Discussion

Twelve articles were selected and reviewed based on the inclusion criteria. Two main groups of nicotine dependence measures have been identified: unidimensional (traditional) measures and multidimensional measures. The unidimensional measures, such as FTND, DSM, TDS, and CDS assess dependence as one dimension and focus more on the endpoint outcome of nicotine dependence (e.g. heavy smoking, time to first cigarette in the morning, and cessation ability), whereas the multidimensional measures, such as NDSS and the WISDM, provide more insight into the mechanism underlying nicotine dependence. Table 1 compares the PROS and CONS of nicotine dependence measures. In addition, table 2-5 compare nicotine dependence measures based on various criteria.

Measure	PROS	CONS
FTND [12]	• Predict important outcome such as smoking cessation • Ability to predict smoking relapse • Widely used in various studies and population • Available in many languages	• Lack increment validity • Lack ability to predict withdrawal • Lack theoretical grounded • Unidimensional measure • Not appropriate for theoretical and mechanistic research
DSM [13]	• Reliable measure • Widely used in numerous studies and various population • Appropriate for clinical and descriptive research • Predict heaviness • Appropriate for population based study.	• Unidimensional measure • Does not predict withdrawal and relapse • Not appropriate for theoretical and mechanistic research • Lack evidence of convergent validity
TDS [14]	• Reliable • Concise • Reflect DSM and ICD-10 • Appropriate for case finding and epidemiological study.	• Dichotomous measure • Unidimensional measure • Not appropriate for theoretical and mechanistic research

CDS [15]	• Good psychometric proprieties. • High face validity. • Availability of brief form.	• Modest amount of validity support its use • Unidimensional measure
NDSS [16]	• Multidimensional measure • Increment validity • Predict withdrawal and relapse	• Low liability of some subscales • Complex scoring
WISDM-68 [17]	• Good psychometric proprieties • Multidimensional measure • Assess mechanism of dependence • Appropriate for theory driven research	• Redundancy • Some subscale lack validity • Not appropriate for clinical research

Table 1: *Compares the PROS and CONS of nicotine dependence measures.*

Measure	Definitions of nicotine dependence
FTND [12]	Theoretically, ''it is a state produced by chronic drug administration, which is revealed by the occurrence of signs of physiological dysfunction when the drug is withdrawn; further, this dysfunction can be reversed by the administration of drug". Operationally, it is defined as getting a score of more than 6 for the FTND. The total score is obtained by summing the given points for each item.
DSM [13]	Theoretically, it as a cluster of cognitive, behavioral, and physiological symptoms indicating tolerance, withdrawal, and compulsive smoking behavior. Operationally, it requires having at least 3 of the 7 DSM criteria of nicotine dependence.
TDS [14]	Theoretically, it is a cluster of cognitive, behavioral, and physiological symptoms for which the individual attributes use of tobacco despite significant tobacco-related problems. Operationally, it is a score of 6 or greater on TDS scale. The scale has 10 items to assess 10 DSM tobacco dependence criteria, with 0 indicating lack of the symptom and 1 indicating endorsement of the criterion. The best cutoff score was determined from the receiver operator characteristic analyses as a scale score at which a sum of the sensitivity and the specificity at maximum.
CDS [15]	Theoretically, it as a cluster of cognitive, behavioral, and physiological symptoms indicating tolerance, withdrawal, and compulsive smoking behavior. Operationally, it is measured by 12 items, or 5 items in the short version, were designed to index the dependence outcomes, such as "Please rate your addiction to cigarettes" and "On average, how many cigarettes do you smoke per day?"
NDSS [16]	Theoretically, the definition of nicotine dependence is based on the multidimensional conceptual framework for the dependence syndrome (Edwards and Gross's, 1976) that considered the essential elements of the syndrome to include (a) a narrowing in the repertoire of drug use behavior, (b) increased salience of drug-seeking behavior, (c) increased tolerance to the drug, (d) repeated withdrawal symptoms, (e) repeated relief or avoidance of withdrawal symptoms by further drug use, (f) subjective awareness of a compulsion to use the drug, and (g) rapid reinstatement of the syndrome after relapse. Operationally, it is measured by 19-item scale, each item is rated on a 5-point Likert scale from 1 = "Not at all true" to 5 = "Extremely true". The total score is measured using factor analysis. However, it was not stated if there is a cutoff point on this scale.
WISDM-68 [17]	Theoretically, it is a property of motivational processes that influence compulsive drug use and an inability to quit. Operationally, it is measured by a 68-item scale designed to assess 13 domains on a 7-point Likert scale ranging from 1 - "Not true of me at all" to 7 - "Extremely true of me." Subscales are scored by taking the average of all of the answers relevant to that subscale. However, it was not stated if there is a cutoff point on this scale.

Table 2: *Compares nicotine dependence measures based on their conceptual and operational definitions.*

Measure	Subjects and their characteristics	Items
FTND [12]	• Total Sample: 245 [male: 111, female: 143, age: 17-77yrs, race: Canadian]	(1). How soon after you wake up you smoke your first cigarette [0-3 points]; (2). Do you find it difficult to refrain from smoking in places where it is forbidden? [0-1 points]; (3). Which cigarette would you hate most to give up? [0-1 points]; (4). How many cigarettes per day do you smoke? [0-3 points]; (5). Do you smoke more during the first hours after waking than during the rest of the day? [0-1points]; (6). Do you smoke even when you are ill enough to be in bed most of the day? [0-1 points].
DSM [13]	• Sample: 4414 persons [1132 male, 1004 female, aged: 15 -54 years, race: Black Hispanic Other White]	(1). Tolerance; (2). Withdrawal; (3) use of tobacco by the subject more than the subject intended; (4) the persistent desire or unsuccessful efforts to cut down on nicotine use; (5) much of time spent using tobacco (e.g., chain smoking); (6) the necessity to give up activities in favor of nicotine use; (7) and continued use despite recurrent physical or psychological problems likely to have been caused by nicotine use
TDS [14]	• Sample 1: 58 males [age: 27.6 ± 11.1, race: Japanese] • Sample 2: 148 [115 males (age: 43.1 ± 15.60), 33 females (age: 33.0 ± 12.4), race: Japanese] • Sample 3: 194 males [age=NM, race: Japanese]	(1) Smoking more than he/she intended, (2) a desire to quit smoking and unsuccessful efforts to quit smoking, (3) craving for tobacco, (4) withdrawal symptoms, (5) smoking to avoid withdrawal symptoms, (6) smoking despite a serious illness, (7) smoking despite health problems, (8) smoking despite mental problems, (9) feeling dependent on tobacco, and (10) giving up important activities for smoking.
CDS [15]	• Preliminary survey: [internet 145, mail 384, gender: NM, Race: NM, age: 18-70] • Main survey: [3009 participant; 47% males, age: 12-74, race: NM]	(1) Addiction rate (2) Number of cigarettes (3) time of first cigarette at morning (4) ability to quit (5) time of irresistible urge (6) The idea of not having any cigarettes causes me stress (7). Before going out, I always make sure that I have cigarettes with me (8). I am a prisoner of cigarettes (9). I smoke too much (10). Sometimes I drop everything to go out and buy cigarettes (11). I smoke all the time (12). I smoke despite the risks to my health
NDSS [16]	• Study 1: [317 participants, 57% females, race: NM, age: 44.2 ± 10.3, • Study 2: [802 participants, 57% females, age: 39.2 ± 10.6, race: 66% White, 31%, Black 3% others] • Study 3: 91 participants [59% males, race: 81% White, age: 34.5 ± 9.0]	1. Drive 2. Tolerance 3. Continuity 4. Stereotypy 5. Priority

WISDM-68 [17]	• Total sample: 775 [303 males, 454 females, 18 not identified, race: 638 White, 83 African-American, 54 others, age: ≥18]	1. Affiliative attachment 2. Automaticity 3. Behavioral Choice/ Melioration/ Alternative reinforcement 4. Cognitive enhancement 5. Craving 6. Cue exposure/associative processes 7. Loss of Control 8. Negative reinforcement 9. Positive reinforcement 10. Social and environmental goads 11. Taste and sensory properties 12. Tolerance 13. Weight control

Table 3: *Compares nicotine dependence measure based in various criteria.*

Measure	Structure	Research Base	Reliability	Primary Intended Use	Heaviness	Withdrawal	Relapse
FTND [12]	6 items, 2 factors	• Numerous studies, • Various populations	• α =5.56-.70	Clinical/ descriptive research	Yes (CPD)	No	Unknown
DSM [13]	Structure clinical interview, 2 factors	• Numerous studies, various populations	• K=5.78	Clinical/ descriptive research	Yes (Heavy vs. light smokers)	No	Unknown (abstinence over 1 year)
TDS [14]	10 items	• Two Studies, mainly Japanese men	• α = 5.74-.81	Clinical/ descriptive research	Yes (CPD, CO, years smoking)	No	Unknown
CDS [15]	12 items, 1 factor	• Two studies, participants assessed via mail or internet.	• α =5.77-.84 • α = 5.90-.91	Clinical/ descriptive research	(CPDa, cotinine, daily vs. occasional smoking)	Unknown	No

NDSS [16]	19 items, 5 factors	• One paper (3 studies) with adults • One study with adolescents (12-18)	• For 30-item scale: • Drive: α =.76 • Priority: α =.69 • Tolerance: α=.55 • Continuity: α =.63 • Stereotypy: α =.70 • Total NDSS: α =.84	Theoretical/mechanistic research	Yes (CPD)	Yes (severity of past withdrawal, urge intensity, restlessness).	Yes (difficulty abstaining; latency to relapse)
WISDM-68 [17]	68 items, 13 factors WISDM-68	• One study, daily and nondaily adult smokers	• Subscales, α =.84-.96 • Total WISDM-68, α =.98-.99	Theoretical/mechanistic research	Yes (CPD, CO)	Unknown	Yes (end of treatment) Unknown
CPD: Cigarettes Smoked Per Day; CO: Carbon Monoxide							

Table 4: *Compares nicotine dependence measure based on various criteria.*

Measure	Administration procedure and training	Administration length	Cost	Validity	Scoring and Interpretation
FTND [12]	Self- report questionnaire, no special training	Short	Free	Predictive validity	**Scoring:** A total score for nicotine dependence is obtained by summing the given points for 6 items where minimum = 0 and maximum score = 10. **Interpretation:** the cutoff for nicotine dependence is 6 or more.
DSM [13]	Individual interview, need special training	Long	Free	Face validity	Scoring: by scoring 40 items measure 7 criteria where 1 means having that item and 0 means not having that item
TDS [14]	Self- report questionnaire, no special training	Short	Free	Face validity	**Scoring:** By scoring 10 items, with 0 indicating lack of the symptom and 1 indicating endorsement of the criterion. The best cutoff score was determined from the receiver operator characteristic analyses as a scale score at which a sum of the sensitivity and the specificity at maximum. Interpretation: Getting 6 or greater reflect nicotine dependence.

CDS [15]	Self- report questionnaire, no special training	Short	Free	Face validity Predictive validity	Scoring: By summing responses on all 5 items (CDS-5) or 12 items (CDS-12). Each item is rated on a 5 point scale. Interpretation: Not stated
NDSS [16]	Self- report questionnaire, no special training	Long	Free	Predictive validity Convergent validity	**Scoring:** By multiply the participant's answer on each question by the specific factor loading provided by the author, and then sums each factor-adjusted answer relevant to the subscale being calculated. **Interpretation:** Not stated
WISDM-68 [17]	Self- report questionnaire, no special training	Long	Free	Convergent validity	**Scoring:** The total score is the average score for 68 items. These items are measured on a 7-point Likert scale ranging from 1 - "Not true of me at all" to 7 - "Extremely true of me." Subscales are scored by taking the average of all of the answers relevant to that subscale. **Interpretation:** Not stated

Table 5: *Compares nicotine dependence measure based in various criteria.*

It is obvious that nicotine dependence measures are not highly related to each other and there is no ideal measure. Hence, it is important to select the measure that has appropriate psychometric properties, is suitable for the target population, and reflects the conceptual definition for the construct in which the researcher is interested. For instance, if the researcher intends to assess the dependence itself as a diagnosis or to assess the outcomes of dependence, such as smoking heaviness and cessation ability, FTND and DSM criteria are more appropriate. Although these unidimensional measures have only fair reliability, employ inconsistent or unknown structures that are not based on a specific theory, and have only fair predictive and convergent validities, they are widely used. FTND is widely used because of the existence of substantial prior research, its ability to predict smoking outcomes (e.g. heaviness, cessation, and relapse), its shortness, and its availability in many languages; whereas DSM criteria are widely used because of their great face validity and their appropriateness for the clinical and epidemiological studies that focus on diagnosing nicotine dependence.

On the other hand, if the researchers intend to assess the mechanism of nicotine dependence or many dimensions of nicotine dependence, multidimensional measures, such as NDSS and WISDM, are more appropriate for that purpose. Despite the multidimensional nature of these measures, they are new and need further research to support their construct validity and to test them on various populations.

Conclusion

This article reviewed and evaluated nicotine dependence measures that are commonly used in smoking and nicotine dependence research. The measures included he unidimensional measures, such as FTND, DSM, TDS, and CDS; and the multidimensional measures, such as NDSS and the WISDM. It is important to select the instrument that has appropriate psychometric properties, is suitable for the target population, and reflects the conceptual definition for the construct in which the researcher is interested.

Bibliography

1. Douglas A and Ahmed A. "Cigarettes: the facts, strategies for smoking cessation, e-cigarettes and vaping". In: A Prescription for Healthy Living. Elsevier (2021): 177-190.

2. Grant BF., *et al*. "Nicotine use and DSM-IV nicotine dependence in the United States, 2001–2002 and 2012–2013". *The American Journal of Psychiatry* 177.11 (2020): 1082-1090.

3. Zhu J., *et al*. "Nicotine dependence as an independent risk factor for atherosclerosis in the National Lung Screening Trial". *BMC Public Health* 19.1 (2019): 1-6.

4. Goodwin RD., *et al*. "Predictors of persistent nicotine dependence among adults in the United States". *Drug and Alcohol Dependence* 118.2-3 (2011): 127-133.

5. Mohanram MG and Diwakar MKP. "Association between nicotine dependence and exhaled carbon monoxide level among truck drivers in Chennai City". *International Journal of Community Dentistry* 7.2 (2019): 34.

6. Piper ME., *et al*. "Assessing tobacco dependence: a guide to measure evaluation and selection". *Nicotine and Tobacco Research* 8.3 (2006): 339-351.

7. Zulkifley NH., *et al*. "The correlation of two nicotine dependence measurement methods: Fagerstrom test for nicotine dependence (FTND) and saliva cotinine among a group of Muslim Smoker in Malaysia". *The Malaysian Journal of Medicine and Health Sciences* 13 (2017): 43-50.

8. Alghzawi H., *et al*. "Remission from nicotine dependence among people with severe mental illness who received help/services for tobacco/nicotine use". *International Journal of Methods in Psychiatric Research* 29.4 (2020): 1-11.

9. Alghzawi H. "Probability and correlates of nicotine dependence among smokers with and without major depressive disorder: Results from the national epidemiology survey on (2018).

10. Alghzawi HM and Storr CL. "Gender Differences in the Interrelations Among Social Support, Stressful Life Events, and Smoking Cessation in People With Severe Mental Illnesses". *Journal of the American Psychiatric Nurses Association* (2021).

11. Sato N., *et al*. "Assessment Scales for Nicotine Addiction". *Journal of Addiction Research and Therapy* S1 (2012): 008.

12. Heatherton TF., *et al*. "The Fagerström test for nicotine dependence: a revision of the Fagerstrom Tolerance Questionnaire". *British Journal of Addiction* 86.9 (1991): 1119-1127.

13. American Psychiatric Association AP, Association AP. Diagnostic and statistical manual of mental disorders: DSM-5 (2013).

14. Kawakami N., *et al*. "Development of a screening questionnaire for tobacco/nicotine dependence according to ICD-10, DSM-III-R, and DSM-IV". *Addictive Behaviors* 24.2 (1999): 155-166.

15. Etter J-F., *et al*. "A Self-Administered Questionnaire to Measure Dependence on Cigarettes: The Cigarette Dependence Scale". *Neuropsychopharmacology* 28.2 (2003): 359-370.

16. Shiffman S., *et al*. "The nicotine dependence syndrome scale: a multidimensional measure of nicotine dependence". *Nicotine and Tobacco Research* 6.2 (2004): 327-348.

17. Piper ME., *et al*. "A multiple motives approach to tobacco dependence: the Wisconsin Inventory of Smoking Dependence Motives (WISDM-68)". *Journal of Consulting and Clinical Psychology* 72.2 (2004): 139.

18. Piper ME., *et al*. "Assessing dimensions of nicotine dependence: an evaluation of the Nicotine Dependence Syndrome Scale (NDSS) and the Wisconsin Inventory of Smoking Dependence Motives (WISDM)". *Nicotine and Tobacco Research* 10.6 (2008): 1009-1020.

19. Storr CL., *et al*. "The Fagerström Test for Nicotine Dependence: a comparison of standard scoring and latent class analysis approaches". *Drug and Alcohol Dependence* 80.2 (2005): 241-250.

20. Policy MH and Development S. "Mental Health in Development Jordan Who Promind Kingdom Of (2013).

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