

Development and Reliability Study of the Adolescent Inhalant Use Severity Scale

Kültegin ÖGEL, Alper AKSOY, Ayfer TOPUZ, Olcay LİMAN, Sibel COŞKUN

SUMMARY:

Objective: To develop a scale in order to investigate the severity of inhalant use in adolescents and to conduct reliability and validity studies of this scale.

Method: A questionnaire was developed by conducting interviews with two groups: professionals working with adolescent inhalant users and inhalant-using adolescents. This questionnaire was developed into a 21-item scale. This was applied by two different interviewers to 50 adolescents at Bakırköy Mental Health Hospital Inhalant Use Research and Treatment Center for Children and Adolescents. Two other professionals applied the Visual Analog Scale to the same 50 adolescents to evaluate the severity of inhalant use. The correlation between the two interviewer scores and the scores obtained from the Visual Analog Scale and the 21-item scale was evaluated. Addicts and non-addicts were evaluated using SCID-I and the scores of addicts and non-addicts were compared. Test re-test reliability of the scale was evaluated by applying the scale in the 10-15 days following the first administration.

Results: The correlation between the questionnaire scores and the Visual Analog Scale scores was adequate (0.72). The mean scores of addicts were higher than those of non-addicts ($p < 0.001$). The Cronbach alpha value was 0.84. Three items had no internal consistency and the same items' interrater and test re-test reliability correlations were low.

Conclusion: It is thought that when the 3 inconsistent items are removed the 18-item Yeniden Inhalant Use Severity Scale (YUKUD) is a reliable and valid measure to evaluate the severity of inhalant use in adolescents and that it can be used in related research.

Key Words: Inhalants, validity, reliability, adolescence, severity

INTRODUCTION

Inhalant use and addiction are not new subjects for the world, but research studies and publications about them are limited. Nonetheless, it is well known that inhalant use has some different characteristics and necessitates special approaches (Carlini-Cotrim 1995, Baldvieso 1995, Edwards and Oetting 1995, Jumper-Thurman et al. 1995, Beuvasis et al. 2002). The main difference between inhalant users and other substance users are cognitive problems due to effects of inhalant on the brain (Ron 1986, Richardson 1989). Cognitive problems were reported to occur after two years, but their risk in earlier periods was considerably high (Aydın et al. 2002).

The frequency of aggressiveness was reported to be high in inhalant users (Mackesy-Amiti and Fendrich 1999, White et al. 1999). Aggressiveness was related with the amount and duration of substance use (Inciardi and Surratt 1998). For that reason, evaluation and questioning of aggressiveness are important in inhalant use. Crimes due to substance use, run away from home and self injury are more frequent among inhalant users than other adolescent substance addicts (Farrington 2000, Inciardi and Surratt 1998, Howard and Jensen 1999). As deprivation symptoms are unclear, it is difficult to use psychometric instruments which are developed in order to evaluate addiction severity (Richardson 1989). In an earlier study, we determined that questioning deprivation symptoms in that group of patients was unreliable (Ögel et al. 2003a).

As a considerable proportion of inhalant users are adolescents, the use of conventional evaluation measures about addiction is not so easy. Most of

adolescents do not have any occupation and attend to school, but inhalant users are irregular at school attendance, so different questions should be directed in order to evaluate inhalant use (Noto et al. 1997). We noticed that there was not any scale which was developed in order to evaluate inhalant use. As some inhalant users are adolescents who prefer to live in the streets, there is a need to develop scales and questionnaires which are specific to adolescents who live in the streets (Ögel et al. 2003b).

In our country, inhalants are the most prominent substances which cause addiction (Yazman 1995, Ögel et al. 2001). As a consequence, there is a need for developing new scales which will be used to evaluate substance use characteristics of adolescents. In this article, we aimed to develop a new scale in order to investigate the severity of inhalant use in adolescents.

METHOD

Yeniden Inhalant Use Severity Scale (YUKUD) was planned to be a semi-structured, interviewer administered scale which aimed to evaluate the severity of substance use. Special attention was directed towards following issues in preparation period:

1. Sensitivity for adolescents
2. Easiness and administer ability by various career groups
3. Not requiring interviews with other people (administer ability to inhalant users who live in the streets and have no family).

Development of the scale consisted constitution of the questions and performance of validity and reliability studies.

Development of the scale

In the stage of question development, factors which determined the severity of inhalant use were asked to psychiatrists, psychologists, matching therapists (previous addicts who were not current users, had special training and were near to ages of study population), nurses and teachers (totally 9 people) who were working with adolescent inhalant users. It was aimed to benefit from their experiences. Two focal group interviews were performed with adolescent inhalant users in order to determine factors which formed the severity of addic-

tion according to the experiences of the addicts.

As a consequence of the information obtained, factors which would determine the severity of substance use were transformed into questions which were consistent with scale structure. Questions which took place in the draft of the scale were directed to 6 people who were interested in this subject and its ability to evaluate the severity of symptoms was discussed. As abstinence symptoms specific to inhalant use were controversial, no questions about them were included in the scale (Richardson 1989).

Questions of the scale were asked to 9 inhalant users by two psychologists and it was attempted to evaluate the effect of questioning style on understanding. Necessary changes were performed in questions which were found to be hard to understand. In investigating whether or not a question was hard to understand, it was asked in various types and the answers were compared for similarity.

Definition of the scale

As a result of data obtained, primary draft of the scale which included 21 items was prepared. There was a title of each item which was related with the problem. The scope of this title and 2-3 sample questions which predicted the problem were present below the title. Two types of questions were included in the scale. Questions about frequency like aggressiveness and exposure more than planned or investigating the presence and severity like time expenditure and willing or not quitting took place in the scale. The answer choices varied between 0-4. The answer of "Never" was compensated with "0". Most severe situation was matched with "4". The answers of questions about frequency varied between "very rare" to "more often". The same variation was from "very few" to very much" for intensity.

Questions which were not suitable for an individual adolescent like school were evaluated as "non-applicable" and were coded with "9". Total points of the scale were calculated by dividing total score with the number of applicable questions. The reason for that application was to standardize the scores as some adolescents attended to school while others went to work. As a consequence, problem due to substance use and its severity could be measured.

Table 1. Sociodemographic characteristics of the sampling.

	N	%
Age		
≤14 years	11	22
15-16 years	24	48
≥17 years	15	30
Educational level		
Illiterate	4	2
Educated less than 5 years	34	68
Educated more than 5 years	10	20
Duration of substance use		
≤6 months	16	32
6 months-2 years	20	40
≥2 years	14	28

There are various types of inhalant use. In Turkey, most frequently used inhalants are thinner and adhesives. In order to adapt questions for various types of inhalants, the term “substance” is used to define the inhalant. The interviewer writes the compensation on the questionnaire.

As the idea to develop a scale about inhalant use belonged to “Yeniden Sağlık ve Eğitim Derneği”, it was named as “Yeniden Inhalant Use Severity Scale”.

Validity and Reliability Study of the Scale

The group of subjects

The second stage of the study was to evaluate the validity and reliability. Fifty adolescents ≤18 years who were under therapy in Bakırköy Mental Health Hospital Inhalant Use Research and Treatment Center because of inhalant use in inpatient or outpatient basis. Mean age of participants was 16.5±1.8 years. All of them were males. The reason for this gender characteristic is the relatively low number of inhalant user females. Participants who had severe abstinence symptoms, were decided to be below normal IQ clinically and considered to be unable to complete the interview due to cognitive problems were not included in the study. The interviews were performed when the participants were not under the influence of the inhalant (at least 12 hours later exposure). Participation consents were obtained from the families, or if was not present, from the inhalant users.

Procedure

There is not any other scale to evaluate the severity of substance use in adolescents which was adapted to Turkish and validity and reliability studies were performed. Moreover, we could not find any scale which evaluated inhalant use in the literature. So we preferred expert view as golden standard in order to determine the validity of the scale. For this purpose, a psychiatrist and a psychologist who were in contact with inhalant users for many years interviewed with the participants separately. The experts evaluated the severity of inhalant use with visual analog scale between 1 and 10; “1” was very low and “10” was very high. Two experts scored the participants blinded with each other. In order to evaluate the validity, it was considered to compare the scores of addicts with non-addicts. Because, it was expected that severity in addicts would be higher. For this purpose, a psychiatrist administered alcohol and substance abuse section of structured SCID-I interview form for DSM IV Axis I Disorders to all substance users (Özkürkçügil et al. 1999).

In order to evaluate the reliability of the scale, we aimed to determine the consistency between the interviewers. The scale was filled simultaneously by two psychologists who were in face to face contact with inhalant users. Scoring was performed by psychologists while they were unaware from each other. The procedure was repeated in the same manner within 10-15 days. As inhalant users

Table 2. Inner Consistency Test Cronbach's Alpha Values of Scale Items.

	Corrected total item correlations	Alpha when item was excluded
Frequency	0,4063	0,8404
Exposure more than planned	0,5399	0,8321
Willing quitting	-0,0313	0,8516
Time expenditure	0,4846	0,8376
Unable to perform responsibilities	0,6019	0,8290
Tolerance	0,4105	0,8382
Cognitive problems	0,5825	0,8300
Physical problems	0,3107	0,8415
Accidents and injuries	0,1584	0,8457
Crime	0,4160	0,8378
Relationship problems	0,4396	0,8368
School	0,3042	0,8435
Work	0,5437	0,8313
Intoxication	0,4225	0,8372
Aggressiveness	0,4609	0,8356
Not going to home	0,5203	0,8326
Self harm	0,5099	0,8338
Overcome	0,5291	0,8336
Friends	0,1680	0,8456
Contriteness	0,4615	0,8355
Craving	0,4605	0,8356
Total	0,844	

frequently quit from treatment and clinic, second interviews are planned earlier than usual.

Statistical analysis

Internal consistency: Correlation between each item and total points was considered and internal consistency of whole scale was determined with Cronbach's alpha value.

Validity: Mean points obtained by experts as a result of visual analog scale were taken into con-

sideration in validity study. Mean points for each item and total points of each expert were calculated in the same manner. Mean values of the scale and considerations of the experts were evaluated by using Pearson correlation analysis. Comparison of addicts and non-addicts was performed with Mann Whitney U test as the number of subjects was below 30 in one of the groups.

The evaluations of the interviewers at the beginning and after two weeks were compared with

Table 3. Correlations between interviewers and test-retest points.

	Pearson correlation coefficient between interviewers	Correlations between test-retest points
Frequency	0,787**	0,741*
Exposure more than planned	0,752**	0,696**
Willing quitting	0,666**	0,484*
Time expenditure	0,755**	0,479*
Unable to perform responsibilities	0,664**	0,694**
Tolerance	0,851**	0,888**
Cognitive problems	0,784**	0,716**
Physical problems	0,851**	0,673**
Accidents and injuries	0,632**	0,723**
Crime	0,756**	0,465*
Relationship problems	0,760**	0,838**
School	0,901**	0,799**
Work	0,861**	0,557*
Intoxication	0,658**	0,530*
Aggressiveness	0,682**	0,747**
Not going to home	0,829**	0,697**
Self harm	0,718**	0,733**
Overcome	0,789**	0,705**
Friends	0,869**	0,435*
Contriteness	0,886**	0,572*
Craving	0,854**	0,845**
Total	0,948**	
*p<0.01		
**p<0.001		

Pearson correlation analysis.

FINDINGS

Sociodemographic characteristics of sampling are shown in Table 1. None of the participants was below 13 years of age. Two thirds of the participants were using inhalants for more than six months. According to SCID I, 66% (n=33) of the participants were diagnosed as addict. There were not any differences between addicts and non-addicts according to mean ages (Mann Whitney U test=230, $p>0.05$) and educational levels (chi-square=3.76, $sd=3$, $p>0.05$).

Validity

The validity of the scale was evaluated with the correlation between views of experts and total points obtained from the scale. Mean values of views of experts according to visual analog scale were 5.94 ± 1.76 and 5.80 ± 1.78 (mean= 5.87 ± 1.68). Correlation coefficient between mean values of views of experts and total points of scales which were performed by two interviewers was 0.727 ($p<0.001$, Table 2).

Mean of total points from YUKUD scale of non-addicts was 38.97 ± 13.3 and addicts was

61.37±10.4. The difference between mean values of two groups was statistically significant (Mann Whitney U value=46.5, $p<0.001$).

Internal consistency

Internal consistency of the scale was evaluated with Cronbach's alpha method and the results were presented in Table 2. YUKUD showed a great internal consistency with an alpha value of 0.844. Correlations between total points and items no 3 (willing quitting), 9 (accidents and injuries) and 19 (friends) were low. Highest total-item correlation was present in "unable to perform responsibilities". When items with low correlation were excluded from the scale, alpha value of internal consistency did not change significantly ($\alpha=0.855$).

Reliability

In order to determine the consistency between the interviewers, correlations between item and total points of each interviewer were presented in Table 3. Consistency levels between interviewers were low in willing quitting, unable to perform responsibilities, accidents and injuries, aggressiveness and intoxication items. In general, there was a considerable consistency between interviewers when total points were taken into account (0.94).

When correlations between test-retest points were evaluated, correlation coefficients in willing quitting, time expenditure, crime and friends items were below 0.50 which meant low correlation. But, correlation levels of test-retest points were considerably high (0.845).

DISCUSSION

In this study, we aimed to develop a new scale which would evaluate the severity of inhalant use. The views of experts and points obtained from the scale which were compared in order to evaluate the validity were found to be in close relationship. This finding revealed that the scale was consistent with clinical experiences and capable of measuring the severity of inhalant use. As addiction might be considered as an indicator of severity, higher points of addicts could be accepted as an evidence which revealed that the scale was able to measure the severity of inhalant use. The absence of comparisons with other scales which were shown to be valid might be accepted as a limitation of this study.

Internal consistency of the scale might be considered as adequate. Three items were lower than the desired value of 0.2 (Nunnally and Bernstein 1994), but the consistency of other items were in an acceptable level. When the consistency between interviewers was evaluated, correlation coefficients of five items were below 0.7. Correlation level between interviewers was considerably high (0.94). The previous experiences of interviewers with inhalant users were thought to be effective in providing this high level of reliability correlations.

It was noticed that two of three items which did not have internal consistency (willing quitting, accidents and injuries) were among five items which had lower consistency levels between interviewers. As a consequence, despite alpha value did not change considerably, it was decided to exclude that three items from the scale and use 18-items form.

When correlations between test-retest points were evaluated, correlation coefficients in willing quitting, time expenditure, crime and friends items showed low correlation. This finding supported the thought that it would be better to exclude willing quitting, accidents and injuries due to substance use and inhalant use among friends items. Low correlations in other items included critical aspects like crime. When interview specifications with adolescents were taken into account, it would be preferable to fill a form for sociodemographic characteristics before scale performance in order to build up a closer relationship with the adolescent and obtain more accurate and reliable information. This way of application is not a must, but advised to increase the validity and reliability of the scale.

As the questions of the scale were oriented towards and our sampling consisted adolescents, to perform YUKUD to individuals between 12-18 years of age would be applicable. But as adolescence and its characteristics might be prolonged until 21 years, to perform this scale till this age group is acceptable. To implement the scale to individuals older than 21 years may lead to undesirable consequences.

We believe that to implement YUKUD to a greater group of inhalant users, to perform factor analysis and to determine scale subgroups will be beneficial. Problems which may be seen in a greater sampling will lead to development of the scale. To perform the study in only males is a limitation.

For this reason, the scale should be administered to female inhalant users as well. Thus, comparisons according to gender differences would be probable. As a result, it may be expressed that YUKUD is a reliable scale for evaluating the severity of

inhalant use. With the purpose of completing validity studies, further application of the scale to a greater sampling would be reasonable. Thus, this study may be evaluated as a preliminary study.

REFERENCES

- Aydın K, Sencer S, Demir T et al.(2002) Findings in chronic toluene abuse by inhalation. *AJNR Am J Neuroradiol*, 23: 1173-1179.
- Baldivieso LE (1995) Inhalant abuse in Bolivia. *Epidemiology of inhalant abuse:An international perspective*.(Ed:Kozel N,Sloboda Z,De La Rosa M) Natl Inst Drug Abuse Res Monogr Ser, 148.
- Beauvais F, Wayman JC, Jumper-Thurman P et al.(2002) Inhalant abuse among American Indian, Mexican American and Non-Latin White Adolescents. *Am J Drug Alcohol Abuse*, 28:171-187.
- Carlini-Cotrim B (1995)Inhalant use among Brazilian youth. *Epidemiology of inhalant abuse:An international perspective*.(Ed: Kozel N,Sloboda Z,De La Rosa M) Natl Inst Drug Abuse Res Monogr Ser, 148.
- Edwards R, Oetting ER (1995) Inhalant Use in United States. *Epidemiology of Inhalant Abuse: An International Perspective*. Natl Inst Drug Abuse Res Monogr Ser, 148, p.12-16.
- Farrington DP, Loeber R (2000) Epidemiology of juvenile violence. *Child Adolesc Psychiatr Clin N Am*, 9: 733-748.
- Howard MO, Jenson JM (1999) Inhalant use among antisocial youth:prevalence and correlates. *Addict Behav*, 24: 59-74.
- Inciardi JA, Surratt HL (1998) Children in the streets of Brazil: drug use, crime, violence and HIV risks. *Subst Use Misuse*, 33: 1461-1480.
- Jumper-Thurman P, Plested,B ve Beauvais F (1995)Treatment strategies for volatile solvent abusers in the united states.(Eds:Kozel N, Sloboda Z) *Inhalant abuse: an international perspective*.NIDA Res Monogr 148.
- Mackesy-Amiti ME, Fendrich M (1999) Inhalant use and delinquent behavior among adolescents: a comparison of inhalant users and other drug users. *Addiction*, 94: 555-564.
- Noto AR,Nappo SA,Galduroz JC et al. (1997) Use of drugs among street children in Brazil. *J Psychoactive Drugs*, 29: 185-192.
- Nunnally JC,Bernstein IH (1994) *Psychometric theory*.3.ed. Mc Graw Hill.New York.
- Ögel K et al. (2001) Gençlerde madde kullanım yaygınlığı ve özelliklerinin değerlendirilmesi 2001 araştırma sonuçları.Yeniden Sağlık ve Eğitim Derneği, yayın no:2.
- Ögel K, Liman O, Aksoy A et al.(2003a) Sokakta yaşayan çocuklara yönelik olarak oluşturulan değerlendirme formunun güvenilirliği. 39. Ulusal Psikiyatri Kongresi,Antalya, s.599.
- Ögel K,Aksoy A,Liman O et al.(2003b) Sokakta yaşayan çocuklar ve madde kullanımı. Ek-Bil Yayıncılık, İstanbul. 8
- Özkürkçügil A, Aydemir Ö, Yıldız M et al.(1999) DSM IV Eksen I bozuklukları için yapılandırılmış klinik görüşmenin Türkçe'ye uyarlanması ve güvenilirlik çalışması. *İlaç ve Tedavi Dergisi*, 12: 233-236.
- Richardson H (1989)Volatile substance abuse: Evaluation and treatment. *Human Toxicol*, 8: 319-322.
- Ron MA (1986) Volatile substance abuse: A review of possible long-term neurological, intellectual and psychiatric sequelae. *Br J Psychiatry*, 148: 235-246.
- White HR,Loeber R,Stouthamer-Loeber M et al.(1999) Developmental associations between substance use and violence. *Dev Psychopathol*, 11: 785-803.
- Yazman Ü (1995) Lise gençliğinin psikoaktif maddelere bakışı ve kullanım oranlarının Türkiye-İstanbul örneği ile incelenmesi. Uzmanlık tezi, İstanbul, s.16.