The Validity and Reliability of the Addiction Outcome Assessment Index (AOAI)

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SUMMARY

Objective: The objective of this study was to develop a short scale that assesses the progress and recovery in addiction treatment with respect to all relevant areas, and to determine its validity and reliability.

Method: After scanning the literature and consulting the experts, a pool of questions was. The pilot form was tested in 10 cases then a final 8-item scale was generated. Clinical sample of the study consisted of 307 alcohol/substance users who applied Turkish Green Crescent Outpatient Counselling Center for psychosocial treatment between March 2016 and March 2017. Non-clinical sample of the study is composed by 102 randomly chosen participants without a history of psychiatric disorder. The reliability of the Addiction Outcome Assessment Index (AOAI) questions was determined by computing the Cronbach's alpha coefficient, and the factor structure analysis was determined by varimax rotation. Analysis of the reliability of the change between sessions was conducted via Reliable Change Index-(RCI).

Results: The Cronbach's alpha coefficient for the total Outcome Assessment Index (AOAI) was 0.80. Therapists' total correlation coefficient was 0.75. Explanatory Factor Analysis revealed 2 factors which explains 43.96% of the total variance. The difference between groups' AOAI-Turkish (BASI) mean score was statistically significant. Cut-off point was determined as 8.63. RCI was 3.5. AOAI's first session mean score was 14.92±5.63, the mean score decreased at the tenth session to 9.4±4.71.

Conclusion: The results showed that AOAI is a valid and reliable questionnaire that can be used to measure the progress of different dimensions of alcohol and substance use.

Keywords: Addiction, treatment outcome, outcome scale, validity, reliability

INTRODUCTION

Addiction is a multidimensional disorder. Therefore, the recovery process in addictive disorders must be followed from different dimensions (Laudet 2009). The concept of recovery in patients with addictive disorders is expressed with the terms "remission" and "abstinence". However, there is controversy over what the recovery during the treatment process is and how to measure it reliably. Different definitions for the concept of recovery have been used in the literature on addiction. McLellan et al. (2007) have redefined *recovery in addiction* as finalization of the substance use and increase in functionality in the family, socially and economically.

The Substance Abuse and Mental Health Services Administration (SAMHSA) in the USA, identified seven areas for recovery as the physical health, mental health, familial and social relationships, stability of residence, self-care perception, application for treatment, maintaining within treatment system; and accepted the progress in at least three of these seven areas and complete soberness as the determinants of recovery (SAMHSA 2005). The experts of Betty Ford Institute, on the other hand, defined the concept of recovery from substance dependence as voluntarily gained success in sobriety, personal health, and citizenship and made references to the social dimensions of the concept of recovery (Betty Ford Institute Consensus Panel 2007). Measurability

of recovery is important for contribution to the treatment systems and feedback on the treatment process received by the patients and the physicians, as there may be, from time to time, differences in the views of the patients and the clinicians on the recovery process. It has been pointed out that that clinicians are at risk of ignoring negative outcomes of the treatment given by prioritising the expected positive outcomes (Carlier and van Eden 2017). Studies have also shown that clinicians cannot predict when patients should abandon treatment (Hannan et al. 2005).

The Treatment Outcomes Profile (TOP) scale, is a validated tool developed in the UK, by the National Treatment Agency (NTA) in order to inform and improve practice on both an individual and strategic level and is considered to be important in establishing the standards of feedback in the treatment of alcohol/ substance use disorders. The scale has 20 questions evaluating alcohol/ substance use, risky behavior, criminal behavior, health and social functionality areas (Marsden et al. 2008). Considering the high incidence of comorbidity of psychiatric disorders with dependence disorders, new questions evaluating psychological status were added and put to use, after validity and reliability assessment, in 2013 to evaluate the dependence patients on a wider perspective (Delgadillo et al. 2013). As the views on the concept of recovery developed globally, the TOP has become capable of evaluating comprehensibly the recovery processes of patients with addictive disorders.

One of the tools developed to make a standard assessment in the treatment of addictive disorders is the 135-item (GPRA-CSAT) scale developed in 2010 at the Center for Substance Abuse Treatment (CSAT) on the basis of the Government Performance and Results Act (GPRA) (Darby and Kinnevy 2010, CSAT 2013).

With this scale, it was aimed to make a standard assessment in terms of not only the sobriety status status of the dependent individuals but also on their continuation with abstinence, on working and the level of joining other life activities. This scale was used in a study on individuals whose addiction treatment process were completed in various centers by routine outcome monitoring system, by communicating the questions to the patients using an 18-item core measure telephone survey (Lennox et al. 2013). This study is important in showing the possibility of the continuation of recovery follow-up in the frequently seen cases of drop-out from addiction treatment.

The ultimate goal in the treatment of addictive disorders is not only to ensure maintenance of sobriety, but also the simultaneous development of recovery in different psychosocial areas. The scale, developed by Connors et al.

(2017), considers the state of the patient in different areas including alcohol/ substance use, the urge to use, motivation for change, participation in self-help groups, depression and anxiety levels, legal status and functionality ; and aims at assessing improvement in dependence and predicting the duration of the stay of the individual under therapy.

Apart from the scales enabling clinicians to evaluate the course of addiction treatment, self-report scales were developed for patients to evaluate their progress. The SURE PROM (the Patient Reported Outcome Measure), one of the scales developed for this purpose, measures the improvement in the areas such as the amount of alcohol/ substance use, desire to use, economic status, mental status, and functionality of the dependent individuals (Neale et al. 2016). There are also softwares that evaluate the course of addiction treatment on the internet. The software MyOutcomes.com provides a service that allows to rate the treatment process and provides feedback to clinicians on payment of a membership fee (http://myoutcomes.com 2018).

Considering the general characteristics of the scales developed to measure the treatment course of addiction shows that these scales are very long by including many questions evaluating the recovery from addiction. This has necessitated the availability of a shorter scale for the clinician to evaluate the treatment process in addiction. Unlike the scales that only focus on abstinence, recovery instruments should also evaluate social aspects of recovery. At the same time, the recovery process should not be evaluated independently of the physicians implementing the therapy, the intervention used and the purpose of the treatment (Donovan et al. 2012). It is seen that some scales evaluating the recovery in addiction, also evaluate the post-treatment process and consider the stability of the cases as the most important element of recovery (Lennox et al. 2013). It is possible to monitor the recovery during treatment by follow-up forms.

Objective assessment tools are needed not only for measuring the course of treatment in clinical practice, but also for research in the addiction field. Objective scales evaluating the course of treatment will improve treatment effectiveness, provide feedback for both clinicians and patients, and contribute to the development of health systems by allowing a comparative assessment between what is expected and what is achieved during addiction treatment (Simpson et al. 1997).

The aim of this present study was to develop an easily applicable scale that can be used in clinical practice and addiction research and to determine its reliability and validity.

METHOD

Development of the Scale

A pool of questions was formed by evaluating the information obtained from literature review and by consulting 6 experts for their opinions. In this process, the areas that should be taken into consideration for following up dependence, and the questions used on these areas in the previously developed scales were investigated. Feedback was received on the variability of follow up period that required prolonged re test intervals, and therefore to exclude the legal item. On the bases of the accumulated,information, an 8-question format to provide concrete data on clinical applications formed the initial draft form of the scale. The scale was planned to be completed by the interviewer during the follow up observation on the patients. Depending on our previous experiences on psychometric scale development, only 10 individuals were randomly selected for the pilot trial of the scale with the expectation to acquire the required data .

The qquestions of the scale were aimed to evaluate alcohol/ substance use amount, alcohol/ substance use frequency, motivation to quit, alcohol/ substance use desire, family relationships, employment/ education status, participation in life, mental and physical status, and treatment compliance. The item on participating in life, as a well-recognized concept in the literature, encompasses several areas as in the examples of other scales (Connors et al. 2017).

Each item is rated from 0 to 4 on a five-point Likert scale. Hence, the highest score that can be obtained from the scale is 32. The questions about the *desire for alcohol/ substance use* and *motivation to quit* were evaluated by a five-point Likert scale with "Never", "Rarely", "Sometimes", "Most of the time", "Almost always". Response options for questions on the *frequency and amount of alcohol/ substance use* were designed as "None", "Very rare", "A few days a week", "Most of the week", and "Almost every day". The answers to the questions about *family relationships, employment/ education status, mental and physical status, and participation in life* were rated on a five-point Likert scale ranging from "Very well" to "Very Bad".

While the questions about the desire for alcohol/ substance use, motivation to quit, family relationships, employment/ education status, mental and physical status, and participation in life assessed the last one week , the questions about the number of alcohol/ substance use days attempted to evaluate the average time when the client was not interviewed. The developed scale was named as the Addiction Outcome Assessment Index (AOAI). The version of the scale in the Turkish language is presented at the end of this document.

Study Participants

The 307 patients participating in this study consisted of alcohol/ substance users between the ages of 18 and 68 who were accepted at the Turkish Green Crescent Counseling Center's (YEDAM) outpatient clinic for psychosocial counseling between March 2016 and March 2017. The control group was formed in accordance with previous similar studies (Janse et al. 2013) by 102 randomly selected participants who did not have any psychiatric diagnoses and/ or alcohol/ substance use disorders. The characteristics of the two groups are presented in Table 1.

The study was approved by the Institute of Social Sciences Ethics Committee at Hasan Kalyoncu University (Reference No: 2018/18, Date: May 2nd, 2018).

Psychometry

Sociodemographic data were extracted from the questions of the Addiction Profile Index (API), which is a reliable and validated scale, included in the YEDAM software and frequently used in the YEDAM centers. The economic status, family relationships were evaluated with an analog scale with increased scores indicating the magnitude of the problem.

The Addiction Profile Index (API): The Addiction Profile Index (API), developed by Ögel et al. (2012), is a self-report questionnaire that consists of 37 items to measure addiction severity and evaluate the different characteristics of addiction. Each item is rated from 0 to 4 on a five-point Likert scale. The questionnaire consisted of five subscales measuring the characteristics of substance use, the criteria for addiction diagnosis, the effect of substance use on the individual's life, strong craving for substance use, and the motivation for cessation of substance use. The subscale scores are calculated separately and the total score is obtained by weighting the subscales. The Cronbach's alfa coefficient for the whole questionnaire is 0.89 and ranges from 0.63 to 0.86 for the subscales. The API was administered to all of the participants included in the study.

After reviewing the literature, a reliable and validated scale was not found for evaluating the course of addiction treatment scale. Therefore, we were unable to present a comparison data using another scale.

Information on the Treatment Program

The Turkish Green Crescent Counseling Center (YEDAM) is a center that gives free psychological and social support to outpatients with alcohol/ substance use disorder. Patients aged 16 years and over are accepted to the center

for treatment. Clinical evaluations are made at the first visit and the appropriate treatment program is planned according to the substance use characteristics such as severity of dependence and comorbid diagnoses. The treatment program at the YEDAM consists of weekly individual psychotherapy sessions, homeworks, family sessions, and psycho-education group therapy sessions. Individual therapies consist of mostly Cognitive-Behavioral Therapies, Motivational Interviews, and Mindfulness Therapies. In psycho-educational group sessions, the SAMBA treatment program has been administered to both patients and their families. The SAMBA treatment program is a structured program implemented by the trained psychologists.

Procedure

The Addiction Outcome Assessment Index (AOAI) was completed with each of the 307individuals accepted at the Turkish Green Crescent Counseling Center (YEDAM) between the dates of March 2016 and March 2017 and had clinical evaluation interviews and follow-ups. Some participants (n=61) were interviewed by two clinical psychologists. The participants were followed up by the center and the AOAI scale was re-tested ten times. The interviews did not take place within a standard follow-up period and the average interval between the interviews was 14±5.5 days. The scale was tested on the control group of 102 individuals by clinical psychologists at the centers where the study was conducted.

Statistical Analysis

To facilitate the assessment of the educational status; the ranking was categorized as low (literate, elementary and middle school graduates) and moderate-high (lyceé and university graduates). For the marital status variable, only the data on the married and single people were taken into consideration because the rest of the data were very few. The number of attempts to quit was categorized as "None", "1–3 times", "4–9 times", and "10 and above"; In the past, the number of psychiatric/ psychological treatments was categorized as "None", "1 time", "2–3 times" and "4 and above". The Cronbach's alpha coefficients of the AOAI items were calculated for reliability analysis and the factorial structure of the scale was examined by the principal factor analysis with Varimax rotation. The reliability of the inter-interview variations during the follow-up was analyzed by the Reliable Change Index (RCI), which was developed by Jacobson and Truax (1991). Reliable Change Index (RCI) is a concept in measurement and assessment. An RCI is a psychometric criterion used to evaluate whether a change

in an individual score over time, such as the difference in a score between two measurements in time, is considered statistically significant. Comparison of the scores of the patient and control group participants and determination of the cut-off score was performed using the cut-off score formula suggested by Jacobson and Truax (1991) which allows researchers and clinicians to determine whether a given score falls within the ''dysfunctional'' or ''functional'' (i.e., improved) state of the patients under clinical therapy. All statistical analyses were performed by the Statistical Package for Social Sciences (SPSS) version 17 for Windows (SPSS, Inc., Chicago, IL, USA). Statistical significance was accepted for $p<0.05$.

RESULTS

The mean age of the 307 participating patients was 28.84 (±7.59) years and males were in majority. The mean age of the control group was 29.00 (±8.4) years and the majority gender was male. In the patient group 62.2% had low level of education, while 89.2% of the control group had medium-high level of education. The majority of the patients and the controls were unmarried; 46.4% of the patients used synthetic cannabinoids (n=96), 10.1% used cannabis (n=21), 17.4% (n=36) used heroin, 16.4% (n=34) used alcohol, and 9.6% (n=20) used other substances (Table 1).

The mean total AOAI score of the patient group was 14.9±2.11 while the mean total AOAI score of the control group was 5.11±2.08 (Table 2) and the difference was statistically significant ($t = 4.06$, $p<0.05$). The cut-off score of the scale was 8.63 and the Reliable Index of Change (RCI) was found to be 3.5, meaning that a decrease of 3.5 points from the total score of the scale indicates a statistically significant change.

The Cronbach's alpha coefficient of the whole scale was 0.80. The Cronbach's alpha coefficient obtained in the second, fifth and tenth interviews were 0.79, 0.85 and 0.84, respectively. The correlation coefficient of the total scores obtained by the different interviewers was 0.75 ($p<0.001$). Correlation of the scores on the individual items obtained by the different interviewers were calculated as 0.73 for alcohol/ substance use desire, 0.87 for alcohol/ substance use frequency, 0.77 for alcohol/ substance use amount, 0.55 for family relationships, 0.88 for employment status, 0.44 for physical status, 0.51 for mental status, and 0.8 for participation in life ($p <0.001$) (Table 3).

An explanatory factor analysis was performed using the Principal Component Analysis with Varimax rotation. In the explanatory factor analysis, two factors were obtained

Table 1. Sociodemographic Characteristics of the Participants

	Patient Group			Control Group		
	n	%	Mean±SD	N	%	Mean±SD
Age	307		28.84±7.59	102		29,0±0,44
Gender						
Female	17	5.5		32	31.4	
Male	290	94.5		70	68.6	
Education status						
Low	189	62.2		11	10.8	
Medium-High	118	37.8		91	89.2	
Marital status						
Married	70	22.5		25	25	
Single	237	77.5		75	75	
Employment status						
Full-time, regularly employed	124	40.5				
Irregularly employed	57	18.6				
Unemployed	125	40.8				
Economical status	304		1.12±1.25			
Family relationships						
Relationship with mother	284		1.34±0.93			
Relationship with father	241		1.77±1.08			
IV substance use						
Not present	280	92.1				
Present	24	7.9				
Previous psychiatric/ psychological treatment			0.36±1.8			
Number of addiction treatment as inpatient			0.11±0.5			
Number of addiction treatment as outpatient			0.23±0.7			
Number of quit attempts			1.80±8.2			
API total score			7.21±3.5			

Table 2. Reliability Coefficients of Addiction Outcome Assessment Index and Correlations between the Results of the Interviewers

	Scale mean when item deleted	Scale variance when item deleted	Item-Total score correlation	Cronbach's alpha coefficient when item deleted	Cronbach's alpha coefficient	Correlations between interviewers
Alcohol/ substance use desire	11.24	22.97	0.6	0.42	0.76	0.73
Alcohol/ substance use frequency	11.77	20.89	0.65	0.75	0.76	0.87
Alcohol/ substance use amount	11.98	23.19	0.62	0.74	0.76	0.77
Family relationships	11.51	26.48	0.46	0.33	0.79	0.88
Employment status	10.96	25.99	0.34	0.23	0.81	0.88
Employment status	11.80	28.13	0.42	0.24	0.79	0.44
Employment status	11.37	27.09	0.51	0.41	0.78	0.51
Participation in life	11.20	25.58	0.6	0.47	0.77	0.68

Table 3. Factor Structure of the Addiction Outcome Assessment Index

	Factor 1	Factor 2
Participation in life	0.79	0.21
Mental status	0.75	0.17
Family relationships	0.66	0.19
Employment status	0.62	0.18
Physical status	0.57	0.19
Alcohol/ substance use amount	0.10	0.93
Alcohol/ substance use frequency	0.18	0.91
Alcohol/ substance use desire	0.32	0.71

Varimax with Kaiser Normalization was performed

Table 5. The Minimum, Maximum, and Mean Scores on the Addiction Outcome Assessment Index at the Successive Testing (interviews) on the Patient Group

	n	Minimum	Maximum	Mean Standard Deviation
1st Interview	307	0.00	32.00	14.92±5.63
2nd Interview	230	2.00	28.00	12.21±5.36
3rd Interview	174	0.00	25.00	11.24±5.63
4th Interview	139	0.00	28.00	11.10±5.87
5th interview	115	0.00	24.00	10.83±5.66
6th Interview	81	1.00	20.00	9.90±4.75
7th Interview	66	3.00	22.00	10.01±4.61
8th Interview	48	2.00	23.00	10.08±5.85
9th Interview	38	3.00	25.00	9.55±4.63
10thInterview	30	1.00	24.00	9.40±4.71

Table 4. Scores of the Patient and the Control Groups on the Addiction Outcome Assessment Index

	Patient Group			Control Group		
	N	Mean	Standard deviation	N	Mean	Standard deviation
AOAI Total	307	14.92	5.63	102	5.11	2.08
Alcohol/ substance use desire	307	1.86	1.27	-	-	-
Alcohol/ substance use frequency	307	1.35	1.46	-	-	-
Alcohol/ substance use amount	307	1.14	1.19	-	-	-
Family relationships	307	1.59	0.915	102	0.78	0.69
Employment status	307	2.18	1.22	102	0.94	0.71
Physical status	307	1.34	0.73	102	0.96	0.62
Mental status	307	1.76	0.77	102	1.16	0.76
Participation in life	307	1.94	0.90	102	0.98	0.82

accounting for the total variance; with the first factor explaining 43.96% of the variance and the second factor explaining 17.11% of the variance (Table 4). The respective eigen values of the first and the second factors being 3.51 and 1.36, both being greater than 1. All items had factor loadings greater than 0.30. The items were distributed largely as expected. The first factor and the second factors may be considered as the "psychosocial items" and the second "substance use properties", respectively. Factor loading on the AOAI substance use dimension and the Psychosocial factors hidden variables changed between 0.72-1.00 and 0.55-1.00, respectively. Kaiser-Meyer-Olkin test for sampling adequacy value was 0.76; and the Bartlett's test for sphericity chi–square result was 863.396, sd=28, p=0.000.

When the re-test numbers and the case numbers were considered (Table 5), the total number of participants who attended the 10 successive interviews was 30. While the mean AOAI score at the first interview was 14.92 ± 5.63, this was significantly lower at the tenth interview with a mean score of 9.4±4.71 and the difference was significant (t=4.16, sd:29, p<0.05). It can be proposed that these findings indicate that the scale is sensitive to change.

DISCUSSION

The Addiction Course Index (AOAI) is a scale designed to evaluate the individual's course of recovery in different areas, during the addiction treatment process. The reliability coefficient of the scale was found to be sufficiently high and the correlations between the total scores obtained by the different interviewers was found to be sufficiently strong.

In the exploratory factor analysis, it can be said that AOAI has a good factor structure. Factors emerging from the analysis can be divided into social factors and substance-related factors. The social factors comprised the items on participation in life,

mental status, family relationships, employment status, and physical status; and the substance-related factors included the amount of alcohol/substance use, the frequency of alcohol/substance and the desire to use alcohol/ substance. It can be said that the scale evaluates psychosocial recovery as well as cessation of substance use. The two-factor structure can be said to overlap with the clinical practice. The substance use level and the psychosocial recovery of the individual follow two different courses. This version of the scale can be said to evaluate the psychosocial recovery next to abstinance from using substance which demonstrates the importance of evaluation of 'recovery' on different bases.

As it was not possible to reach in the literature survey another reliable and validated scale used in the field of addiction treatment course, a comparative evaluation of the AOAI has not been possible. The mean AOAI scores of the patient and the control groups differed significantly. Therefore, it can be said that the scale has discriminative capacity and convergent validity. The discrimination of the participants with dependency from the controls on the basis of the AOAI scores is expected to yield quantitative information on the recovery with treatment. The patient can show any degree of improvement but only these data can indicate how close the recovery is to the score level of the control group. The AOAI claims to be an observational follow up type of scale which have to be sensitive to change. In our study, the AOAI scores of the patients, who continued to attend the 9 interviews after the first interview, were observed to decrease significantly with the treatment received. This finding shows that the scale is sensitive to change.

The majority of the patients participating in this study were substance users. In the RCI the preferred substance is placed in the parethesis indicating 'substance'. Hence, the substance preferred by the patient can be selected when testing with the AOAI. The same method has also been used with API with good results (Ögel et al. 2012).

This study has limitations, one being the decrease in the number of the patients who dropped out of the treatment during the follow-up period. It was found that more males than females consulted the YEDAM for treatment. Although gender was not considered to be a decisive factor in treatment outcomes during the addiction treatment (Greenfield et al. 2007), future follow-up studies with equal numbers of female-male participants may allow the assessment of gender differences in the addiction recovery process. Another limitation of this study is the significant difference between the education levels of the patient and control groups. Also, the AOAI was evaluated on the basis of outpatient treatment at a psychosocial support center, which indicates that the AOAI should be tested on inpatients with higher addiction severity.

In conclusion, it can be stated that the AOAI scale is a reliable and valid scale that differs from other scales evaluating the course of treatment in being shorter. The AOAI scale also differs from other standard follow-up tools in not only measuring abstinence, but also takes into account social recovery factors. We expect that the AOAI, which has been developed as a tool to assess the course of an objective treatment, will contribute to research in addiction as well as evaluating the course of treatment.

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