Problem Drinking Scale (PDS) – psychometric characteristics

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Summary

Aim. The presented study aims at checking and demonstrating the psychometric characteristics of the new tool – the Problem Drinking Scale (PDS), which is used for quantitative and qualitative analysis of alcohol use disorders conceptualized according to DSM-5.

Method. 708 adults with different levels of alcohol consumption were examined, including 91 individuals recruited in addiction treatment clinics. The remaining persons, with different socio-demographic characteristics, were recruited using the snowball method. Validity of the scale was assessed by correlating the obtained results with the AUDIT (Alcohol Use Disorder Identification Test), while reliability was assessed by internal consistency analysis.

Results. The presented analysis demonstrates high validity and reliability in most areas, which means that the PDS is a tool that can be used in clinical practice. Criterion validity was calculated by correlating PDS results with the AUDIT (r = 0.88, p <.01). The results in particular areas range from r = 0.86 (Difficulty in controlling drinking) to r = 0.77 (Pharmacological dependence). Reliability was calculated using the split-half method, individual values of Cronbach's alpha coefficients with the Spearman-Brown correction vary in specific areas from 0.89 (Difficulty in controlling drinking) to 0.65 (Risky use of substances). In none of the areas the results were lower than 0.60.

Conclusions. The PDS is a useful research tool for quantitative and qualitative analysis of alcohol use disorders. This scale is helpful in making a full and accurate clinical diagnosis taking into account the severity of the disorder and in monitoring changes in the treatment process.

Key words: Problem Drinking Scale, alcohol use disorder, DSM-5, AUDIT

Introduction

Modern biopsychosocial models of addiction stress the importance of multifactor interaction, and the consequence of defining them is the need to create measurement tools with good validity and reliability parameters. The American Psychiatric Association introduced a new diagnostic category in 2013: alcohol use disorder – AUD, which allowed clinicians to assess alcohol problems, not only categorically, but also dimensionally [1].

AUD develops in about 20% of alcoholic drinkers. The transition from low risk drinking to excessive drinking, harmful and distorted alcohol use is dynamic and gradual [1–5]. Moreover, NESARC studies (*National Epidemiologic Survey on Alcohol and Related Conditions*) indicate a bi-directional change in the intensity of alcohol consumption over the lifetime, even in people diagnosed with addiction [6]. This means that for every person it is possible not only to diagnose AUD on a scale of the disorder, starting from its absence to its severe form, but also to monitor changes occurring over time.

Inclusion of AUD in DSM-5 allows to avoid diagnostic difficulties such as underestimating the alcohol problem. An example here may be the so-called non-pathological drinking of alcohol. It turns out that even if someone drinks every day but small amounts of alcohol or episodic states of poisoning occur, the disease will not always be diagnosed in such cases [1, 2]. DSM-5 classification also allows to reduce the probability of diagnosing addiction in risky drinkers [7]. In the paradigm adopted so far, alcohol dependence was treated as a chronic and incurable disease [8–11]. On the other hand, the authors of DSM-5 emphasize that it was an erroneous assumption and had not only diagnostic but also treatment-related consequences. Focusing on the treatment of people with a diagnosis of alcohol addiction, who were offered alcohol abstinence therapy, led to the omission of harmful drinkers. It is estimated that for about four million people in Poland, who drink alcohol in a risky and harmful way, there were no proper therapeutic proposals [12].

The AUD conceptualization in DSM-5 justifies the introduction of alcohol reduction programs in order to change the drinking pattern to the one being less harmful to the health. Various institutions around the world, apart from pointing to the legitimacy of participation in abstinence programs for persons with deep addictions, also recommend alcohol reduction programs for persons with less intense AUD [13, 14]. In Poland, the State Agency for the Solution of Alcohol-related Problems has developed and recommended an alcohol reduction program (www.parpa.pl), which also has an equivalent in the form of a web platform (Drug addiction treatment/Drinking reduction program tab) and the E-POP telephone application [15]. Researchers postulate the need to create new research tools to assess problems related to alcohol consumption [16]. One of such tools is the presented Problem Drinking Scale (PDS) which allows to assess whether the problem of addiction exists. Furthermore, the PDS enables the evaluation of a severity of alcohol-related problems and identification of the patient's biggest problems in the context of the areas of his/her functioning.

Characteristics of the Problem Drinking Scale

The Problem Drinking Scale (PDS) is an original tool based on the concept of alcohol use disorder, analyzed in DSM-5 [1]. The PDS tool comprises 22 items: each of the 11 criteria for alcohol use disorder is assessed by answering two items.

The aim of the PDS is to estimate the severity of the current alcohol problems, analyzed in four dimensions: impaired control over alcohol use, impairment of social functioning, risky use of substances, and pharmacological dimension.

The dimension of impaired control is considered to be a fundamental aspect of the alcohol use disorder. It includes the first four criteria according to DSM-5, which relate to the experienced alcohol craving and the ability to control drinking. The first criterion in this dimension concerns the frequency of alcohol consumption in larger quantities or for longer periods than intended. The second covers the phenomena associated with persistent thirst for alcohol or the accompanying unsuccessful attempts to limit or control it. The third criterion includes behaviors related to devoting a lot of time to activities associated with acquiring alcohol, drinking and mitigating the effects of drinking. The fourth one focuses on the analysis of alcoholic craving or strong thirst for alcohol.

The second dimension of the symptoms of alcohol use disorder relates to the presence of social problems resulting from alcohol abuse, which are diagnosed on the basis of three further criteria: the fifth criterion relates to the relationship between alcohol consumption and fulfillment of important responsibilities, the sixth – awareness of alcohol-related harm in the social area, and the seventh criterion relates to the progressing changes in the drinker's lifestyle, consisting in the weakening of his or her existing important interests on account of drinking.

The third dimension, risky use of alcohol, includes two symptomatic criteria. The eighth criterion refers to repeated drinking where it is physically risky and the ninth criterion refers to continued drinking despite being aware of persistent or recurring physical or mental problems caused or aggravated by drinking.

Another area of the alcohol use disorder is the pharmacological dimension, comprising criteria relating to neurobiological mechanisms. It is crucial for recognizing alcohol use disorder. The tenth symptomatic criterion in DSM-5 concerns tolerance, while the eleventh criterion is related to the alcoholic withdrawal syndrome [1, 17].

In the PDS, a person assesses his/her own behavior on a scale from 0 to 2, where 0 means lack of a given experience or occurring sometimes, 1 – frequently occurring and 2 – almost always occurring. For each of the 11 diagnostic criteria a person can obtain from 0 to 4 points. In order for a criterion to be considered satisfied, the examined person must score at least one point in two items in the given criterion.

The interpretation in the PDS is both quantitative and qualitative. A quantitative assessment refers to the number of criteria that a person has assessed as more than 0, and thus has scored at least one point in two questions concerning one criterion. The criteria are counted and on this basis it can be concluded whether the level of

alcohol use disorder is mild, moderate or severe. On the other hand, the qualitative analysis concerns the characteristics of behaviors and likely problems in functioning associated with meeting a specific criterion [15]. Table 1 contains Problem Drinking Scale sheet.

Table 1. **Problem Drinking Scale sheet**

Problem Drinking Scale – PDS
by: Barbara Bętkowska-Korpała, Robert Modrzyński, Jolanta Celebucka, Justyna Kotowska, Katarzyna Olszewska-Turek
Instruction: Below you can find 22 statements relating to alcohol drinking. Read them carefully and mark with a cross one answer which best describes your way of drinking during the last 12 months. Irrespective of the answer please specify: how many times a month, on average, the described behavior occurred.

1	I happen to get drunk or hear from others that I have drunk too much ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
2	I spend more time drinking alcohol than I intended ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
3	I drink more alcohol than I wanted ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
4	When I start drinking it is hard for me to stop ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
5	I drink alcohol while performing various duties ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
6	I try so it doesn't look that I have drunk alcohol ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
7	In situations of nervousness, anxiety, joy or other emotions, I think of drinking or I just reach for alcohol ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always

8	I have a strong desire to drink alcohol ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
9	I happen to neglect my household duties because of my drinking ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
10	I'm having more and more difficulty meeting my obligations at work because of drinking alcohol ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
11	I keep drinking even though my close ones ask me to drink less ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
12	I keep drinking even though it makes my relationship with other people worse ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
13	I've been neglecting my interests because of my drinking ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
14	I'm more likely to meet with friends I can have a drink with than with non-drinkers ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
15	I happen to undertake behavior which is risky to life or health under the influence of alcohol, e.g., driving, having casual sex, participating in fights or arguments ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
16	I've been told that while under the influence of alcohol I am behaving in a way that is dangerous to my health and/or that of others ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
17	I keep drinking even though I know that alcohol makes my health and physical condition worse ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always

18	I keep drinking even though I know that alcohol will not solve my emotional difficulties in the long run ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
19	I drink more alcohol than I used to ☐ the same (or less, because I decided so) ☐ More ☐ Much more
20	I get drunk with less amount of alcohol than I used to ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
21	When I become sober, I feel bad – physically and mentally, e.g., I feel anxious, irritable, I have mood changes, sleep problems, nausea, shaking hands ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always
22	I drink alcohol to improve my bad mood which I have after previous drinking alcohol ☐ Never or sometimes or not applicable ☐ Often ☐ Nearly always

The aim of the study is to adapt the PDS analyzing the severity of alcohol use disorder, conceptualized according to DSM-5 [1].

Material and method

In the study, an adapted original method was used, i.e., the Problem Drinking Scale (PDS) and the Alcohol Use Disorders Identification Test (AUDIT) developed by the WHO, which was used to test the validity of the PDS. The AUDIT has been widely recognized as the 'gold standard' in assessing the presence of current alcohol use disorder. Following the introduction of the new DSM-5 manual, the results of studies on statistical characteristics of the AUDIT showed that it is still a valid procedure in screening tests [16, 18]. Therefore, the authors of this study used the AUDIT in their analyses to assess the validity and reliability of the PDS.

The psychometric properties of the AUDIT, in many populations analyzed in terms of sociodemographic and cultural factors, are very high: Cronbach's' alpha results range from 0.80 to 0.94 and the time stability is r = 0.88. The AUDIT result is a good predictor for health and social problems related to alcohol consumption [19]. AUDIT was designed to be used in many cultural circles. It has been translated into many languages, including Polish [20–22].

Process of the PDS preparation

Works on the PDS began in 2018. In the first stage, a group of specialists working in the field of treatment of addiction, based on literature and clinical experience, developed several diagnostic questions for each AUD criterion according to DSM-5. In the next stage, as a result of qualitative and compliance assessment in the group of clinicians, two diagnostic questions to one criterion were selected. This was performed in such a way that 48 competent judges had selected the most relevant items for each of the eleven criteria. They were asked to mark their estimation for each item on a scale from 1 to 6, where 1 meant that the item did not refer to the conceptualization of the criterion at all, and 6 meant that it fully referred to the conceptualization of the criterion. On this basis, 22 items (two for each criterion) which received the highest marks for compliance with the adopted criterion description were selected [17]. In the third stage, a pilot study on the PDS and AUDIT was carried out in the group of 70 adults (patients of addiction facilities, as well as among people with different sociodemographic and health characteristics), asking for comments on the formulated items in the PDS. In the fourth stage, comments were analyzed and the PDS items were clarified in terms of content and language.

Respondents

The study assessing psychometric characteristic of the PDS was conducted in a group of 708 adults (F: 49.15% and M: 50.85%) from various backgrounds. The mean age of the respondents was 35.5 years (SD = 13.72). Nearly 40% of the respondents were in the 21–30 age group, 22% – in the 31–40 age group, 32.5% – in the 41–60 age group, 5.5% were people over 61 years of age. 67.28% of people were married or in partnership. The study group consisted of people who agreed to participate in the study, regardless of the presence or severity of alcohol problems and general condition. Table 2 presents a distribution of the respondents' results by addiction and gender based on the AUDIT score.

Table 2. **Addiction criterion met by gender**

		AUDIT_Addiction					
		Not addicted		Addicted		Total	
		N	%	N	%	N	%
Gender	F	300	57.25	48	26.23	348	49.22
	M	224	42.75	135	73.77	359	50.78
	Total	524	74.12	183	25.88	707	100.00

$chi^2(1) = 52.23$; $p < 0.001$

The recruitment was conducted in two ways. The first way was to invite to participate in the project people treated for addiction in outpatient clinics where people with

different diagnoses undertake the therapy. The second way of recruitment was to use the 'snowball' method. The starting point were people with different sociodemographic characteristics. Lack of consent to participate in the study or its withdrawal during the study was assumed the criterion of exclusion from the study.

Test procedure

This was an anonymous and one-time study. Individuals from different backgrounds received information about the purpose of the study and the possibility to resign from participation in it. Then, after giving their consent, they filled in questionnaires. According to AUDIT's instructions, they were asked to provide their gender and age. The study lasted up to 30 minutes. People filled in the questionnaires at any time, convenient for them, with the possibility of taking breaks. The study was exploratory in nature and did not involve any risk of side effects in the respondents. Individuals did not benefit materially from the participation in the study. Those willing to participate in the study could ask the investigator to see their results. Then the test results were entered into the developed database.

Results

In order to verify the existence of the assumed factors (Difficulty in controlling drinking; Problems in social functioning; Risky use of substances; Pharmacological dependence) a confirmatory factor analysis was performed. Due to the fact that particular questions were rated on a three-point ordinal scale, it could not be assumed that results' distribution in each question was close to normal and therefore DWLS estimator was used. The analyses were performed with lavaan package [23] in R environment [25]. The results showed a very good fit of the model: CFI = 0.991; TLI = 0.990; SRMR = 0.039; RMSEA = 0.048 [0.043; 0.053].

PDS validity analysis

Criterion validity of the PDS questionnaire was estimated using Pearson's r statistics, correlating the results obtained in the Problem Drinking Scale with the AUDIT questionnaire. Table 3 presents the correlations for individual dimensions, criteria and the sum of PDS scores.

Table 3. **Results for the criterion validity of the PDS and AUDIT questionnaires**

PDS dependent variable: dimension, criterion, sum of scores	AUDIT Sum
Dimension: Difficulty in controlling drinking	0.86**
Criterion 1: Frequent consumption of alcohol in larger quantities or for the time longer than intended	0.78**

Criterion 2: Persistent thirst for alcohol or the accompanying failure to limit or control drinking	0.79**
Criterion 3: Spending a lot of time on activities related to acquiring alcohol, drinking and mitigating the effects of drinking	0.67**
Criterion 4: Alcohol craving or thirst or need to drink	0.76**
Dimension: Problems in social functioning	0.82**
Criterion 5: Recurring alcohol consumption resulting in neglecting major duties at work, school or home	0.66**
Criterion 6: Alcohol consumption despite continuous or recurring social and interpersonal problems caused or aggravated by alcohol	0.75**
Criterion 7: Reduction or abandonment of important social, professional or recreational activities due to alcohol	0.77**
Dimension: Risky use of substances	0.78**
Criterion 8: Returning to alcohol consumption in situations of threat and physical danger	0.58**
Criterion 9: Alcohol consumption despite continuous or recurring physical or mental problems, possibly caused or aggravated by alcohol	0.75**
Dimension: Pharmacological dependence	0.77**
Criterion 10: Appearance of an alcohol tolerance related to the need for a significantly increased quantity of alcohol (up to the point of intoxication) to achieve the desired effect or with a noticeable significant reduction in the effect of using the same quantity of alcohol	0.62**
Criterion 11: Alcohol withdrawal syndrome	0.76**
Sum of PDS scores	0.88**

** p <0.01

Analysis of results indicates high criterion validity of results (r = 0.88, p <0.01). Results in particular dimensions range from r = 0.86 (Difficulty in controlling drinking) to r = 0.77 (Pharmacological dependence). It can therefore be concluded that the strength of the link between individual dimensions of the PDS and AUDIT is high. In terms of individual criteria the obtained results range from r = 0.79 (Persistent thirst for alcohol or the accompanying unsuccessful attempts to limit or control drinking) to r = 0.58 (Returning to alcohol consumption in situations of threat and physical danger). The strength of the relationship varies from average to high. All the obtained results are statistically significant. In addition, the significantly higher results obtained in people treated for addiction may be treated as an indicator of high validity of the scale.

Reliability

The reliability of the questionnaire determines the accuracy with which it measures the described phenomenon. Among many methods of assessing reliability, the authors chose internal consistency measures of reliability. This method consists in examining the consistency of responses of the respondents to particular test questions.

The assessment is made by determining the so-called Cronbach's alpha coefficient. It is assumed that the questionnaire is reliable when it obtains alpha values >0.70; and high reliability of the questionnaire when it exceeds 0.80. The assessment of the reliability of the Problem Drinking Scale is presented in Table 4.

Table 4. **Evaluation of the reliability of the Problem Drinking Scale in individual dimensions of DSM-5**

Dimension of DSM-5 and sum of PDS scores	Cronbach's alpha	Split-half reliability[1]
Difficulty in controlling drinking	0.91	0.89
Problems in social functioning	0.88	0.88
Risky use of substances	0.78	0.65
Pharmacological dependence	0.70	0.68
Sum of PDS scores	0.96	0.95

[1] Split-half reliability with Spearman-Brown correction

The internal reliability was not calculated for the 11 individual criteria. This was not advisable, as each criterion consists of only two items.

The obtained data show that the overall value of the indicator in the PDS is 0.95, which means that the questionnaire has a high level of reliability. Individual values of the alpha coefficients range from 0.89 (dimension: Difficulty in controlling drinking) to 0.65 (dimension: Risky use of substances). In none of the dimensions the results were lower than 0.60. The presented analysis shows high reliability in most dimensions, which means that the PDS is a tool that can be used in clinical practice. However, precaution should be taken when interpreting the dimension of risky use of substances and pharmacological dependence.

The obtained results were also analyzed in terms of gender differences. Table 5 contains a detailed description as regards the dimensions and individual criteria.

Table 5. **Differences between men and women in terms of the studied PDS variables: dimensions, criteria and sum**

PDS dependent variable: dimension, criterion, sum of scores	Means		SD		t	df	η^2	p
	F	M	F	M				
Difficulty in controlling drinking	2.86	4.99	3.66	4.45	-6.84	687	0.06	<0.001
Criterion 1	0.62	1.24	0.99	1.33	-6.97	699	0.06	<0.001

table continued on the next page

Criterion 2	0.81	1.55	1.15	1.41	-7.69	700	0.08	<0.001
Criterion 3	0.67	1.05	0.95	1.11	-4.89	706	0.03	<0.001
Criterion 4	0.74	1.11	1.08	1.23	-4.27	697	0.03	<0.001
Problems in social functioning	1.52	2.93	2.43	3.08	-6.67	692	0.06	<0.001
Criterion 5	0.29	0.66	0.74	1.03	-5.52	705	0.04	<0.001
Criterion 6	0.45	1.03	0.92	1.23	-7.12	702	0.07	<0.001
Criterion 7	0.79	1.24	1.07	1.20	-5.25	697	0.04	<0.001
Risky use of substances	1.18	1.98	1.69	1.99	-5.69	698	0.04	<0.001
Criterion 8	0.31	0.63	0.71	0.97	-5.01	702	0.03	<0.001
Criterion 9	0.87	1.35	1.22	1.36	-4.93	701	0.03	<0.001
Pharmacological dependence	1.39	2.10	1.62	1.97	-5.14	687	0.04	<0.001
Criterion 10	0.81	1.02	0.93	1.06	-2.81	693	0.01	0.005
Criterion 11	0.52	1.07	0.90	1.23	-6.81	701	0.06	<0.001
Sum of PDS scores	7.15	12.15	8.78	10.74	-6.52	652	0.06	<0.001

t – Student's t-test; df – degrees of freedom; η^2 – eta squared; p – level of significance

The analysis of results indicates significant differences between women and men in a total result, individual dimensions and criteria. A strength of a difference in the total result ($\eta^2 = 0.06$, p <0.001) should be interpreted as a mean.

Women score significantly lower in the PDS compared to men, which is in accordance with a clinical knowledge about gender differences in AUD. This result confirms a necessity of recognizing gender differences in the diagnosis of alcohol problems.

The next stage was the analysis of differences between persons treated for AUD and persons not treated for alcohol problems (Table 6).

Table 6. **Differences in terms of the examined PDS variables: dimensions, criteria and sum between persons with AUD diagnosis treated in an addiction treatment facility and persons not treated for alcohol problems**

PDS' dependent variable:	N		Means		SD		U	p
Dimension, criterion, sum of scores	Not treated	Treated	NT	T	NT	T		
Difficulty in controlling drinking	587	97	3.15	8.71	3.65	4.25	9768.0	<0.001
Criterion 1	598	97	0.73	2.18	1.05	1.39	12700.0	<0.001
Criterion 2	598	97	0.97	2.57	1.21	1.28	11495.0	<0.001
Criterion 3	604	97	0.69	1.97	.93	1.13	12199.0	<0.001
Criterion 4	597	97	0.76	2.00	1.06	1.26	13582.0	<0.001
Problems in social functioning	593	94	1.70	5.66	2.41	3.19	9437.5	<0.001

Criterion 5	604	96	0.32	1.47	0.75	1.21	13278.0	<0.001
Criterion 6	601	96	0.54	2.06	0.96	1.25	10339.0	<0.001
Criterion 7	596	96	0.84	2.09	1.04	1.25	13175.5	<0.001
Risky use of substances	596	96	1.34	3.14	1.77	1.91	13893.5	<0.001
Criterion 8	600	97	0.41	.86	.83	1.00	21407.5	<0.001
Criterion 9	599	96	0.94	2.29	1.22	1.31	13397.5	<0.001
Pharmacological dependence	587	95	1.45	3.64	1.59	2.15	12130.0	<0.001
Criterion 10	591	97	0.80	1.62	0.93	1.19	17346.5	<0.001
Criterion 11	599	97	0.58	2.14	0.92	1.31	10596.5	<0.001
Sum of PDS scores	557	91	7.78	21.32	8.72	10.43	8685.5	<0.001

SD – standard deviation; U – value of Mann-Whitney test; p – level of significance

The analysis of results indicates that people who underwent treatment for addiction obtain significantly higher rates in all criteria, dimensions and sum of PDS scores (U = 8685.5; p <0.001), which can be considered an additional indicator of the tool's high validity.

The next stage of the analyzes was to check a distribution of addicted persons based on PDS scores (total score and individual results) and AUDIT. Table 7 shows the detailed data in terms of alcohol addiction in the AUDIT and PDS.

Table 7. **PDS and AUDIT versus addiction (in the light of the AUDIT item 20 criterion)**

PDS dependent variable:	N		Means		SD		U	p
Dimension, criterion, sum of scores	Not addicted	Addicted	NA	A	NA	A		
Difficulty in controlling drinking	506	181	2.08	9.13	2.70	3.20	5349.50	<0.001
Criterion 1	517	182	0.44	2.34	0.78	1.12	9345.00	<0.001
Criterion 2	519	181	0.66	2.68	0.98	1.07	9841.50	<0.001
Criterion 3	522	184	0.52	1.86	0.82	1.01	15717.00	<0.001
Criterion 4	515	182	0.46	2.25	0.81	1.03	9644.50	<0.001
Problems in social functioning	512	180	0.96	5.83	1.57	2.58	4817.00	<0.001
Criterion 5	522	183	0.13	1.45	0.46	1.13	15825.00	<0.001
Criterion 6	519	183	0.28	2.05	0.68	1.10	8901.00	<0.001
Criterion 7	515	182	0.56	2.29	0.81	1.02	10163.00	<0.001
Risky use of substances	516	181	0.82	3.75	1.31	1.61	8105.50	<0.001
Criterion 8	520	182	0.20	1.25	0.54	1.12	21404.00	<0.001

Criterion 9	517	183	0.62	2.51	.98	1.12	11371.00	<0.001
Pharmacological dependence	506	181	1.02	3.78	1.24	1.73	9634.00	<0.001
Criterion 10	510	183	0.61	1.78	0.80	1.02	18007.50	<0.001
Criterion 11	518	183	0.35	2.07	0.66	1.14	10965.50	<0.001
Sum of PDS scores	478	173	4.96	22.59	6.05	7.40	3526.00	<0.001

SD – standard deviation; U – value of Mann-Whitney test; p – level of significance

The analysis of results indicates significant differences in the scores between addicted and not addicted people, particularly in the total result: 4.96 vs. 22.59, which can be considered an additional indicator of the tool's high validity.

Discussion

The presented study aims to check and demonstrate the psychometric properties of a new tool – the Problem Drinking Scale – created within the application and website of the e-POP project (www.e-pop.pl), designed for quantitative and qualitative analysis of alcohol consumption. High values of validity and reliability indicate that the PDS adequately measures the problems related to alcohol consumption, identifying women and men who consume alcohol with low risk of harm, those who drink in a risky and harmful way and those with high probability of alcohol dependence.

The categorical approach in ICD-10 and categorical-dimensional approach in DSM-5 are not mutually exclusive but complement each other, hence the quantitative and qualitative analysis of the obtained answers and results in the presented PDS scale is possible. The study was conducted in a diverse group of people with different levels of alcohol use disorder, from abstainers, through persons drinking in a risky and harmful way, to persons addicted to alcohol. In ICD-10, the term "risky alcohol use" does not exist, although it seems to be an important part of the diagnosis. It covers a large group of people who consume alcohol, which has often been neglected in the current treatment system. This gap is to some extent filled by the fact that when interpreting the AUDIT both the number of obtained points and the distribution of responses in particular problem areas are important [12], and these areas are risky drinking, harmful drinking and symptoms of addiction. Therefore, the combination of AUDIT results and the diagnosis on the basis of ICD-10 allowed for a categorical and dimensional understanding of alcohol dependence. On the other hand, the PDS, based on DSM-5 and the approach to alcohol consumption on a continuum from the absence of alcohol problems to severe alcohol use disorder, allows for a more complete characteristic of this phenomenon. The effective solution of alcohol problems requires the creation of a system of assistance for people who consume alcohol in a risky and harmful manner before the accumulation of damage, including addiction, occurs [12].

The PDS as a diagnostic tool may be helpful in making a full and accurate clinical diagnosis. The results on the scale, analyzed in terms of quantity and quality, can form the basis for a diagnosis of a nosological and psychological nature. The PDS fits into the perspective of an individualized approach to patient treatment and facilitates the implementation of consistent therapeutic interactions by complementing the information obtained from the clinical interview.

Another practical aspect of the application of PDS results is their use for accurate and adequate qualification for treatment programs on the basis of quantitative (score) and qualitative analysis (analysis of responses in terms of four DSM-5 categories) [25], both at the beginning, i.e., during qualification for treatment program, and at further stages of therapeutic interactions. The design of the tool allows to capture changes taking into account the four dimensions of the patient's functioning in the context of alcohol use, which gives the possibility of reconstructing an individual therapeutic plan if the desired changes in the therapy process do not occur [1, 17, 26].

Conclusions

1. The analysis of research results showed very good statistical parameters of the PDS:
   a. Very high internal reliability was obtained, especially for the dimensions: Difficulty in controlling drinking, Problems in social functioning. Precaution should be taken when interpreting the following dimensions: Risky use of substances and Pharmacological dependence;
   b. High correlations of PDS and AUDIT results were obtained, which prove good validity of the PDS. The analysis of the obtained results allows to use the PDS in clinical practice as a screening tool.
2. The analysis of the obtained results allows to use the PDS in the diagnosis of AUD, qualification for treatment programs and evaluation of therapeutic interventions.

References

1. Gałecki P, Pilecki M, Rymaszewska J, Szulc A, Sidorowicz SK, Wciórka J, editors. *Kryteria diagnostyczne zaburzeń psychicznych DSM-5*. Wroclaw: Edra Urban & Partner; 2018.

2. Morrison J. *DSM-5 bez tajemnic. Praktyczny przewodnik dla klinicystów.* Krakow: Jagiellonian University Press; 2016.

3. Edwards AC, Gillespie NA, Aggen SH, Kendler KS. *Assessment of modified DSM-5 diagnosis of alcohol use disorder in a genetically informative population*. Alcohol. Clin. Exp. Res. 2013; 37(3): 443–451.

4. Martin CS, Verges A, Langenbucher JW, Littlefield A, Chung T, Clark DB. *Algorithm analysis of the DSM-5 Alcohol Withdrawal Symptom*. Alcohol. Clin. Exp. Res. 2017; 42(6): 1073–1083.

5. McCabe SE, West BT, Jutkiewicz EM, Boyd CJ. *Multiple DSM-5 substance use disorders: A national study of US adults.* Hum. Psychopharmacol. Clin. Exp. 2017; 32: 1–10.

6. Dawson DA, Grant BF, Stinson FS, Chou PS, Huang B, Ruan WJ. *Recovery from DSM-IV alcohol dependence: United States, 2001–2002.* Addiction 2005; 100(3): 281–292.

7. Bartoli F, Carra G, Crocamo G, Grocamo C, Clerici M. *From DSM-IV to DSM-5 alcohol use disorder: An overview of epidemiological data.* Addict. Behav. 2015; 41: 46–50.

8. Saunders JB. *Substance dependence and non-dependence In the Diagnostic and Statistical Manual of Mental Disorders (DSM) and the International Classification of Diseases (ICD): Can an identical conceptualization be achieved?* Addiction 2006; 101(1): 48–58.

9. Takahashi T, Lapham G, Chavez LJ, Lee AK, Williams EC, Richards JE, Greenberg D, Rubinsky A, Berger D, Hawkins EJ, Merrill JO, Bradley KA. *Comparison of DSM-IV and DSM-5 criteria for alcohol use disorders in VA primary care patients with frequent heavy drinking enrolled in a trial.* Addict. Sci. Clin. Pract. 2017; 12(17): 1–10.

10. Mohler-Kuo M, Foster S, Gmel G, Dey M, Dermota P. *DSM-IV and DSM-5 alcohol use disorder among young Swiss men.* Addiction 2015; 110(3): 429–440.

11. Yoshimura A, Komodo Y, Higuchi S. *Exploration of core symptoms for the diagnosis of alcohol dependence in the ICD-10.* Alcohol. Clin. Exp. Res. 2016; 40(11): 2409–2417.

12. Fudała J. *Rozpoznawanie osób pijących w sposób ryzykowny i szkodliwy.* In: Bętkowska-Korpała B, editor. *Uzależnienia w praktyce klinicznej. Zagadnienia diagnostyczne.* Warsaw: PARPA; 2008.

13. NIAAA. *Helping patients who drink too much: A clinician's guide, updated 2005 edition.* https://pubs.niaaa.nih.gov/publications/practitioner/cliniciansguide2005/guide .pdf (retrieved: 20.04.2020).

14. NICE. *Alcohol USE disorders, assessment and management of harmful drinking and alcohol dependence.* http://guidance.nice.org.uk/CG115 (retrieved: 10.03.2020).

15. Bętkowska-Korpała B, Modrzyński R, Celebucka J, Kotowska J, Olszewska-Turek K. *Podręcznik E-POP dla terapeutów uzależnień.* Warsaw: PARPA; 2020.

16. Tonera P, Behnke JR, Andersena P, McCambridge J. *Alcohol screening and assessment measures for young people: A systematic review and meta-analysis of validation studies.* Drug. Alcohol. Depend. 2019; 202: 39–49.

17. Bętkowska-Korpała B, Modrzyński R, Kotowska J, Olszewska K, Celebucka J. *Wywiad diagnostyczny zaburzenia używania alkoholu – klasyfikacja DSM-5 w kontekście wyzwań dla lecznictwa odwykowego.* Psychoter. 2019; 1(188): 75–91.

18. Moehring A, Rumpf HJ, Hapke U, Bischof G, John U, Meyer C. *Diagnostic performance of the Alcohol Use Disorders Identification Test (AUDIT) in detecting DSM-5 alcohol use disorders in the general population.* Drug. Alcohol. Depend. 2019; 204: 107530. Doi: 10.1016/j.drugalcdep.2019.06.032.

19. Deady M. *A review of screening, assessment and outcome measures for drug and alcohol settings.* https://www.drugsandalcohol.ie/18266/1/NADA_A_Review_of_Screening%2C_Assessment_and_Outcome_Measures_for_Drug_and_Alcohol_Settings.pdf (retrieved: 20.03.2020).

20. Babor F, de La Fuente RJ, Saunders J, Grant M. *Test rozpoznawania zaburzeń związanych z piciem alkoholu AUDIT.* Warsaw: PARPA; 1993.

21. Babor TF, Higgins-Biddle JC, Saunders JB, Monteiro MG. *AUDIT: The Alcohol Use Disorders Identification Test guidelines for use in primary care.* Geneva: WHO; 2001.

22. Noorbakhsh S, Shams J, Faghihimohamadi M, Zahiroddin H, Hallgren M, Kallmen H. *Psychometric properties of the Alcohol Use Disorders Identification Test (AUDIT) and prevalence of alcohol use among Iranian psychiatric outpatients.* Subst. Abuse Treat. Prev. Policy 2018; 13(1): 1–8. Doi: 10.1186/s13011-018-0141-x.

23. Rosseel, Y. *Lavaan: An R package for structural equation modeling.* J. Statist. Software 2012; 48(2): 1–36.

24. R Core Team. *R: a language and environment for statistical computing.* R Foundation for Statistical Computing, Vienna, Austria; 2018. URL https://www.R-project.org/.

25. Jakubczyk A, Wojnar M. *Całkowita abstynencja czy redukcja szkód – różne strategie terapii uzależnienia od alkoholu w świetle badań i międzynarodowych zaleceń.* Psychiatr. Pol. 2012; 46(3): 373–386.

26. Bętkowska-Korpała B, Ryniak J. *Diagnoza kliniczna w lecznictwie uzależnień.* In: Bętkowska--Korpała B, editor. *Uzależnienia w praktyce klinicznej. Zagadnienia diagnostyczne.* Warsaw: PARPA; 2008.

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