

RESEARCH ARTICLE

Cultural adaptation and validation of the Barratt Impulsiveness Scale (BIS) in a population of Iranian drug and alcohol addicts

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ABSTRACT

This study aimed to culturally adapt and validate the Barratt Impulsiveness Scale (BIS) in a population of Iranian drug and alcohol addicts. The statistical population in this cross-sectional, descriptive, scale development study consisted of all the drug and alcohol addicts in Iran. Of these, 518 were selected as participants using convenient sampling. The measurement tools included a demographic checklist, the BIS, and the Distress Tolerance Scale (DTS). The adaptability and stability of the tool were tested using Cronbach's alpha and ICC to measure its reliability. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were also employed to assess the construct validity of the tool. The clinical cut-off point was determined following the psychiatrist interview (as the gold standard) using the rocking curve (to determine the tool's sensitivity and specificity) in MedCalc-19.4.0. Moreover, CFA, EFA, and descriptive analysis of participants' demographics were performed in AMOS-18, SPSS-24, and SPSS-26, respectively. The mean age of participants was 31.9 ± 9.3 years. Drug abuse was the most common type of addiction among the participants (77.8%). Scratching the body, punching a hard object, and self-injection were the most common impulsive actions. The ICC score calculated using the consistency type was 0.78 (95% CI: 0.45–0.80). A significant inverse relationship was found between BIS and DTS ($P = 0.000$, $r = -0.021$). Three factors were extracted from the Varimax rotation of the factors, and two items (5 and 14) were excluded. The results showed a cut-point of 65, with the best balance exhibiting sensitivity values of 76.6 (62.0–87.7) and specificity values of 52.5 (47.9–57.1) for BIS. Items 27, 29, and 30 were excluded based on the correction indices provided for CFA in AMOS. The goodness of fit indices was satisfactory (CMIN/DF = 2.20, GFI = 0.826, AGFI = 0.792, CFI = 0.754, RMSEA = 0.071). Based on the study findings, it can be concluded that the right

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diagnostic tools can help policymakers, therapists, and other relevant authorities to predict people's proclivity to abuse drugs.

Keywords: impulsivity; drugs; alcohol; Iran

1. Introduction

In Iran, there are approximately 15 million drug users, including those who are both continuous and non-continuous depending on their family size^[1]. Addiction is a disease that is both major and chronic, and arises from genetic, physiological, and social factors, so that the characteristic feature of this disease is a disturbance in control or a feeling of compulsion to perform a specific action, despite the awareness of its dangerous consequences^[2]. Addiction is characterized by features such as compulsive behaviors, irresistible temptations, substance-seeking behaviors, and its continuous use even in situations that bring many negative consequences for the individual. The continuation of drug use over time and the long-term toxic effects of its use on brain function have led to a wide range of behavioral, psychological, social and physiological dysfunction, which prevents addicts from carrying out their normal behavior and performance in the family, work environment and on a wider level in the society^[3,4]. In this regard, several studies have been conducted on the relationship between impulsivity and substance abuse disorder, which show that impulsive behavior is considered as one of the predisposing and perpetuating factors of this disorder and sometimes it determines the type of substances used by addicts, such as the tendency to use stimulants^[5]. In fact, it has been determined that impulsivity is one of the characteristics of types of addiction^[6,7]. Investigations in the field of drug abuse show that the rate of relapse has a direct relationship with the level and intensity of impulsivity, and people with high scores on the impulsivity scale lack of a good outcome in quitting drugs^[8-10]. Impulsive behaviors, which are sometimes called risky behaviors, which include a wide range of actions on which is little thought, they occur in an immature form with immediate occurrence, without the ability to focus on a specific task, without of a proper planning, and they have a high risk and vulnerability^[5,11]. Impulsive behaviors refer to actions that, although they are associated with some degree of potential harm or loss, also have the possibility of obtaining some types of rewards. These behaviors must have three characteristics: a) Choosing between two or more options with a possible reward; b) Accompanying one of the options with the possibility of adverse consequences and outcomes; c) Uncertainty of the probability of adverse outcomes and consequences at the time of the behavior^[12-14]. Some people act impulsively in all situations (depending on the trait), while others act in this way in special situations, such as when facing symptoms that cause cravings (depending on the situation)^[15,16]. Impulsivity has a multi-dimensional structure that includes dimensions such as orientation to the present, gradual reduction of delayed reward, inhibition of behavioral disruption, risk-taking, excitement seeking, sensitivity to reward, prone to boredom, pleasure seeking, poor planning and so on^[17,18]. Impulsivity is also considered as a basic personality trait with biologic determination^[19-21]. The attempt to measure impulsivity scientifically is more than fifty years old. Among the most well-known tools for measuring impulsivity, whose psychometric characteristics have been confirmed in various studies, including Iranian studies, we can mention the Eysenck, Barratt, Diekman and Zuckerman, Eysenck and Murray questionnaires, which have been considered more than others to investigate various aspects of impulsivity. Among the above scales, The Barratt Impulsiveness Scale is one of the most commonly administered self-report measures for the assessment of impulsivity in both research and clinical settings. It provides a sum score and three sub-scores derived from its three subscales (the "attentional impulsiveness" subscale, the "motor impulsiveness" subscale and the "non-planning impulsiveness" subscale^[22,23]. Ekhtiari et al. translated BIS into Farsi and then validated it; however, they only reported its Cronbach's alpha^[24], which cannot provide researchers with accurate psychological information. Considering the lack of accurate psychometric data on BIS, this study culturally adapts and validates this scale in a population of Iranian drug and alcohol addicts.

2. Materials and methods

The statistical population of this cross-sectional, descriptive, scale development study consisted of all Iranian drug and alcohol addicts, some of whom were selected as participants through convenient sampling. According to Monroe, the minimum sample size required for factor analysis is 200 to 500^[25]. More, There should be at least 10 cases for each item in the instrument being used^[26]. Therefore, a sample size of 517 was used in this study.

In a pilot study, the questionnaire was tested and retested within 20 days on a small sample (30 eligible participants). And after the necessary we distributed the questionnaire to the target group. Questionnaires were then distributed to 517 sample populations in prisons, addiction rehabilitation camps, hospitals, addiction treatment clinics that dispense methadone, and NA centers.

This study was approved by the Ethics Committee of Semnan University of Medical Sciences, approved on January 24, 2022 (IR.SEMUMS.REC.1400.280).

The inclusion criteria were a history of intentional self-injurious behaviors; being under 70 years old, minimum reading and writing literacy, a history of opioid abuse documented by urine dipstick and/or alcohol abuse; no addiction to stimulants; clinical diagnosis of opioid abuse by a psychiatrist or a clinical psychologist based on DSM 5 criteria; the patient's informed consent for participation in the research; a history of induced injury or intentional damage to self (based on self-declaration), and exclusion criteria were psychotic symptoms, organic brain disorder (e.g., delirium or dementia), serious suicidal thoughts based on a psychiatrist interview, poisoning with stimulants, intoxication symptoms, and deprivation of any substance affecting the participant's attention, focus, and judgment.

Psychologists and trained assistants collected data in person. We trained these questioners in the following aspects: responsible conduct of research, teaching a general class about substance use disorders and professional behavior for relation with the cases.

The author discussed the research objectives and procedures to encourage the participants to continue the study and then asked them to complete a written consent form.

Informed consent: All participants were informed about the study and asked to complete the questionnaire only if they consented to the study.

2.1. Measurement tools

- 1) **Demographic checklist:** This checklist consisted of questions about age, gender, educational attainment, occupation, and type of addiction.
- 2) **Barratt Impulsiveness Scale (BIS):** Developed by Prof. Ernest Barratt in 2004, the 11th version of the BIS consists of 30 items that measure three aspects of impulsivity: cognitive, motor, and non-planning. The 11th version of the BIS correlates very well with Eysenck's Impulsivity Inventory^[27], as an analysis of the structure of both tools indicates some hasty decision-making and lack of foresight. The items of this tool are scored based on a 4-point Likert scale. The highest score on this tool is 120^[28].
- 3) **Distress Tolerance Scale (DTS):** This self-report index of emotional distress tolerance was developed by Simons and Gaher^[29]. DTS consists of 15 items in 4 subscales: emotional distress (items 1, 3, and 5), attraction by negative emotions (items 2, 4, and 15), subjective assessment of distress (items 6, 7, 9, 10, 11, and 12), and distress relief efforts (items 8, 13, and 4). Distress tolerance (DT) is a common construct used in research on emotional dysregulation. Distress tolerance is defined as the ability to experience and tolerate negative emotional states. Distress tolerance is an individual differences variable referring to the ability to experience and tolerate emotional distress. Distress tolerance is increasingly considered an

important construct of growth, providing new insight into the initiation and maintenance of psychological trauma, prevention, and treatment. Individuals with low DT engage in behavioral disturbance in a wrong attempt to deal with their negative emotions and try to relieve their emotional pain by engaging in destructive behaviors such as drug abuse. Azizi et al. estimated an intraclass correlation of 0.61 for this questionnaire after six months. They also reported a Cronbach's alpha of 0.672 for this scale^[30]. A reliability coefficient of 0.81 was obtained based on the test-retest method for the whole scale and 0.71, 0.69, 0.77, and 0.73 for the four subscales (i.e., tolerance, attraction, assessment, and regulation), respectively. Notably, DTS was used as a divergent tool in this study.

2.2. Data analysis

The adaptability and stability of the tool were tested using Cronbach's alpha and ICC to measure its reliability. EFA and CFA were also employed to assess the construct validity of the tool. The data were then divided into two sets: one for assessing the psychometric characteristics of the tool along with an EFA based on Promax or Varimax rotation to examine the structure of BIS in an Iranian population of addicts and the other for CFA to measure conformity between the theoretical structure and the experimental structure of the research. The clinical cut-off point was determined following the psychiatrist interview (as the gold standard) using the rocking curve (to determine the tool's sensitivity and specificity) in MedCalc-19.4.0. Moreover, CFA were performed in AMOS-18, EFA and descriptive analysis of participants' demographics, SPSS-24, and SPSS-26, respectively.

3. Results

3.1. Demographics

A total of 517 individuals participated in this study. The minimum and maximum ages of the participants were 16 and 67 years, respectively, with a mean of 31.9 ± 9.3 . The data showed that 5 participants (1%), 464 participants (89.7%) were male, and the rest (48 participants) did not specify their gender. Opioid abuse was the most common type of addiction among the participants (77.8%) and another people drank alcohol. Scratching the body (11%), punching a hard object (8.5%), and self-injection (7.5%) were the most common impulsive actions. Other impulsive actions seen among subjects were include swallowing chemicals, Needle-sticking, Rubbing skin against rough surfaces, Wound picking, Punching, Severe scratching, Hair pulling, Carving, Burning, Biting, Cutting. In addition, 22.4% of drug abusers stated that they feel no pain when committing an impulsive action.

3.2. Reliability

An ICC score of 0.78 was calculated using the two-way mixed method in SPSS-26 based on the consistency type (95% CI: 0.45–0.80), indicating the good stability and reliability of the tool^[31]. Based on the 95% confident interval of the ICC estimate, values less than 0.5, between 0.5 and 0.75, between 0.75 and 0.9, and greater than 0.90 are indicative of poor, moderate, good, and excellent reliability, respectively^[32].

First, EFA was employed to validate the subscales of this questionnaire, or the construct validity was validated in Iranian society. Before performing EFA, the KMO and Bartlett's test of sphericity were used to ensure that the sample size was adequate. This item's value was 0.8 and significant ($\text{sig} = 0.000$), indicating meeting the necessary conditions for factor analysis in this study. The data were divided into two parts, and EFA was performed in the first part. The Varimax method was used for factor rotation. As shown in **Table 1**, an EFA suggested that the 3-dimensional structure of Iranian Version of BIS. Based on the Factor Loading, two items (5, 14) were excluded in the EFA analysis for "crossloading" item. Therefore, the EFA was conducted with 28 items (**Table 1**). A "crossloading" item is an item that loads at 0.32 or higher on two or more factors^[33].

Table 1. Principal Component Analysis (PCA) with varimax rotation, Mean \pm SD and Cronbach's alpha (α).

Questions	Cronbach alpha(α)	Mean	SD	Mean	Factor 3	Factor 2	Factor 1	
Q23	0.80	2.2	1.01	2.2			0.660	
Q2		2.27	1.004	2.27			0.629	
Q24		2.1	0.99	2.1			0.620	
Q25		2.6	1.1	2.6			0.613	
Q4		2.31	1.01	2.31			0.605	
Q3		2.55	1.001	2.55			0.554	
Q16	0.56	1.9	1.05	1.9			0.453	
Q17		2.2	1.04	2.2			0.429	
Q6		2.7	0.97	2.7			0.361	
Q12		3.08	1.13	3.08		0.653		
Q9		2.9	1.25	2.9		0.564		
Q30		2.5	1.004	2.5		-0.534		
Q1		3.9	1.2	3.9		0.464		
Q29		2.6	1.01	2.6		-0.449		
Q7		2.8	1.2	2.8		0.446		
Q20		3.01	1.2	3.01		0.424		
Q13		3.1	1.09	3.1		0.422		
Q10		2.5	1.35	2.5		0.414		
Q15		3.07	1.18	3.07		0.413		
Q8		3.3	1.12	3.3		0.325		
Q27		2.6	0.97	2.6		0.307		
Q18		0.71	2.5	1.04	2.5	0.704		
Q11			2.40	1.06	2.40	0.657		
Q28			2.4	1.01	2.4	0.624		
Q21	1.9		1.3	1.9	0.413			
Q26	2.6		1.19	2.6	0.403			
Q22	2.1		1.08	2.1	0.401			
Q19		2.2	0.97	2.2	0.383			

*Factor 1 = questions 2, 23, 24, 25, 4, 3, 16, 17, 6.

*Factor 2 = questions 12, 9, 30, 1, 29, 7, 20, 13, 10, 27, 8, 15.

*Factor 3 = questions 18, 11, 28, 21, 26, 22, 19.

3.3. Convergent questionnaire

The results showed a significant inverse relationship between BIS and DTS ($P = 0.000$, $r = -0.021$). The divergent validity of this scale with DTS was measured. The results indicated a significant inverse relationship between these two tools.

3.4. Criterion validity

When other methods don't have provide more detailed and objective information, ROC analysis is used to determine the cut off score of a psychological measuring instrument (such characteristics as sensitivity, specificity, and positive/negative predictive values).

The discriminative power of a test can determining by ROC analysis by using the sensitivity and specificity and determine the appropriate cut-off score^[34]. These cut-off point can have implications for practice and scientific inference.

In this study, the area under the curve for this scale was 65.8%. According to the results, a cut-point of 65 with the best balance exhibited sensitivity values of 76.6 (62.0–87.7) and specificity values of 52.5 (47.9–57.1) for BIS. As a result, those who score above 65 on BIS are classified as patients needing medical attention. Since the total score obtained on this tool in the target population of this study was 76.1 (SD = 12.1), the target population requires special psychological and psychiatric interventions.

3.5. Confirmatory factor analyses (CFA)

CFA was performed on the second set of data in AMOS, and the results showed that the initial model failed to fit the data.

Figure 1 shows the goodness of fit indexes for the different models tested with CFA of the 3-factor model and Items 27, 29, and 30 were excluded based on the correction indices provided for CFA in AMOS. Goodness of fit indices (CMIN/DF = 2.20, GFI = 0.826, AGFI = 0.792, CFI = 0.754, RMSEA = 0.071) was satisfactory showed that the overall fit was acceptable: it was good in the Iranian Drug and Alcohol Addicts sample.

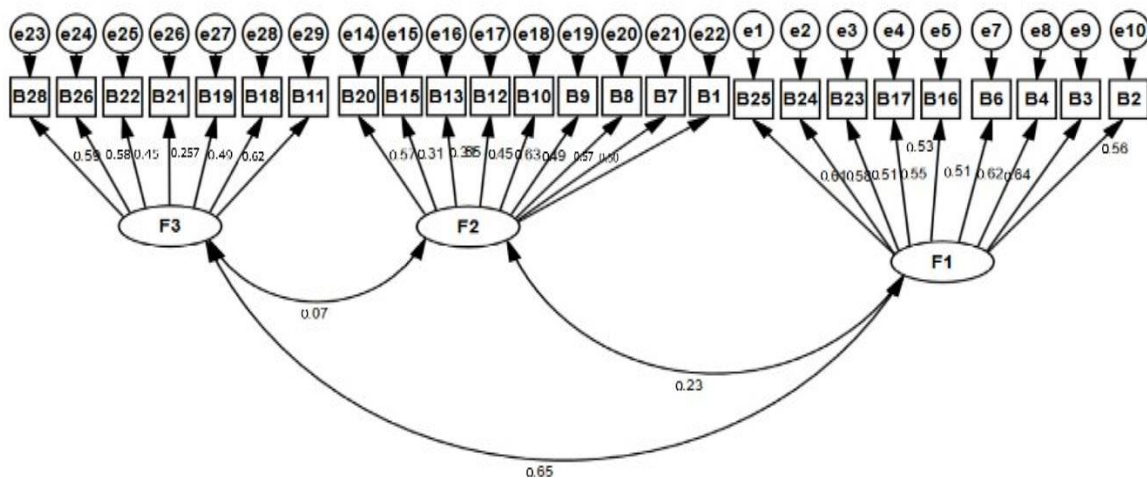


Figure 1. Confirmatory factor analysis for the Persian version of “barratt impulsivity Scale (BIS)”.

4. Discussion

The ICC score (0.78) indicated the stability and reliability of the Farsi version of this tool. The reliability measured in this study was lower than that of the Farsi version reported by Ekhtiari et al.^[35]. However, our

results are consistent with those reported by Javid et al.^[36], who found a test-retest reliability coefficient of 0.77 for BIS^[37].

Three factors were extracted based on the EFA output in this study, which is consistent with the original version developed by Barrett. In addition, items 5 and 14 were excluded in this step (the weak factor load of the items), and the subscales were named “lack of concentration,” “discipline and planning,” and “instability.” These results confirm the multifactorial nature of impulsivity. These findings are consistent with the results of some previous studies^[37–39], but inconsistent with the results of some others^[25]. These differences can be attributed to the cultural and social background and the personal characteristics of participants.

The CFA results showed that the model well fitted the Iranian population of drug abusers, which is consistent with the findings of Somaya^[31], Ellouze et al.^[30], and Juneja et al.^[40], but inconsistent with those found by Al-Hamouri et al.^[41] who reported the inappropriateness of the psychometric parameters of the 11th and 15th versions of the BIS. They suggested that this problem could be solved by reducing the number of items and developing a short form of this scale^[42].

In the current study, the average age of drug users was estimated to be 31 years. The average age of consumers in the similar study was reported to be 31.5 years, which is consistent with the present study^[31]. In Mokri et al.’s study, the average age of consumers was 32.84^[25]. In another study conducted by Sadri et al. in 2016, the average age of addicts was reported to be 34.94 years^[39]. The results show that the average age of drug use is decreasing in recent years.

In the present study, drug abuse (77.8%) was among the most common types of drugs among adults. In the study in Iran, it was reported that the most common substances used by people with addiction were heroin and hashish^[38]. But, in the other similar study in Iran, the most common drug used (98.2%) was opium^[37]. The difference in the type of substances consumed can be due to conducting studies in different regions and consequently access to different substances in different geographical regions in Iran. In the present study Scratching the body, punching the wall or a hard object and Needle sticking are the most common methods of impulsive actions among users, respectively. In a study conducted by Klonsky et al. on 18–19-year-old students, behaviors such as Banging or hitting oneself, followed by hair pulling, pinching, and cutting, and biting were reported as the most common impulsive behaviors^[43]. In Victor et al.’s study with 15–16-year-old drug users, cutting (64%), Banging/hitting self, and burning were the most common impulsive behaviors among them^[42]. Although impulsivity can be present in all people with one of the DSM axis one or two disorders, it is more likely to occur in some psychiatric disorders such as personality disorders, substance abuse, and mania. According to some studies, impulsivity is associated with an underlying mechanism of behavioral inhibition^[44]. The results of the analysis of the main factors of Barat’s impulsivity scale show the effect of three factors of more behavioral activation, less attention, and less planning on impulsivity. These results show that these three factors play a key role in impulsivity. According to other studies, frontal lobe damage also affects attention and planning^[45].

A strength of this study was a cut-point of 65 with the best sensitivity and specificity. In the study conducted by Ekhtiari et al., only Eysenck’s impulsivity factor and Dikeman’s misbehavior exhibited a difference between the two groups of healthy people and drug abusers, indicating a positive correlation with Barrett’s impulsivity factors^[35].

The divergent validity of this scale with DTS was measured. The results indicated a significant inverse relationship between these two tools. The available similar studies have not measured the divergent validity or convergent validity of this scale. Another strength of this study was testing the Farsi version of BIS on drug abusers. The findings suggest using the Farsi version of BIS to measure Persian-speaking populations.

One of the limitations and weaknesses of this study can be mentioned that We used of convenient sampling, while convenient sampling can be a practical choice in certain situations, it is often criticized for introducing selection bias. Given the specific nature of the inclusion criteria, it's important to acknowledge that the findings might not apply to a broader population of drug and alcohol addicts.

5. Conclusion

Impulsivity is an important factor in developing and continuing substance use disorders because of the significant role of high impulsivity in the development of drug abuse^[41]. It can be concluded from the study findings that the right diagnostic tools can help policymakers, therapists, and other relevant authorities to predict people's proclivity to abuse drugs. Conducting an investigation of different demographic characteristics is suggested to examine the psychometric characteristics of this scale.

Author contributions

Conceptualization, MB; methodology, MB and MK; software, MB and GGH; validation, MB and GGH; formal analysis, MB and GGH; investigation, MB and MK; resources, SK, PH, MA and MG; writing—original draft preparation MB and MK; writing—review and editing, MB, MK and GGH. All authors have read and agreed to the published version of the manuscript.

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Conflict of interest

The authors declare no conflict of interest.

References

1. Agency IN. There are 4 million and 400 thousand addicts in the country. 2022 [Available from: <https://www.imna.ir/news/579195/%DB%B4-%D9%85%DB%8C%D9%84%DB%8C%D9%88%D9%86-%D9%88-%DB%B4%DB%B0%DB%B0-%D9%87%D8%B2%D8%A7%D8%B1-%D9%86%D9%81%D8%B1-%D9%85%D8%B9%D8%AA%D8%A7%D8%AF-%D8%AF%D8%B1-%DA%A9%D8%B4%D9%88%D8%B1-%D9%88%D8%AC%D9%88%D8%AF-%D8%AF%D8%A7%D8%B1%D8%AF>. (accessed on 1 June 2022)
2. Thombs DL, Osborn CJ. Introduction to addictive behaviors. New York: Guilford Press; 2019.
3. Sim T, Wong D. Working with Chinese families in adolescent drug treatment. *Journal of Social Work Practice*. 2008;22(1):103–118. <https://doi.org/10.1080/02650530701872439>.
4. Heather N. Is the concept of compulsion useful in the explanation or description of addictive behaviour and experience? *Addictive behaviors reports*. 2017;6:15–38. [10.1016/j.abrep.2017.05.002](https://doi.org/10.1016/j.abrep.2017.05.002).
5. Segal B, Morral AR, Stevens SJ. Adolescent substance abuse treatment in the United States: Exemplary models from a national evaluation study: Routledge; 2014.
6. Demetrovics Z, van den Brink W, Paksi B, Horváth Z, Maraz A. Relating compulsivity and impulsivity with severity of behavioral addictions: A dynamic interpretation of large-scale cross-sectional findings. *Frontiers in Psychiatry*. 2022;13:831992. doi: 10.3389/fpsy.2022.
7. Kapitány-Fövény M, Urbán R, Varga G, Potenza MN, Griffiths MD, Szekely A, et al. The 21-item Barratt

- impulsiveness scale revised (BIS-R-21): An alternative three-factor model. *Journal of Behavioral Addictions*. 2020;9(2):225–246. <https://doi.org/10.1556/2006.20.00030>.
8. Farahani M-N, Amin-Esmaeili M, Baheshmat Juybari S. The mediating role of self efficacy in the relationship between impulsivity and avoidant coping with relapse in opioid dependence. *Scientific Quarterly Research on Addiction*. 2019;13(51):143–166. <http://etiadpajohi.ir/article-1-1647-en.html>.
 9. Kozak K, Lucatch AM, Lowe DJ, Balodis IM, MacKillop J, George TP. The neurobiology of impulsivity and substance use disorders: implications for treatment. *Annals of the New York Academy of Sciences*. 2019;1451(1):71–91. DOI:10.1111/nyas.13977
 10. Argyriou E, Um M, Carron C, Cyders MA. Age and impulsive behavior in drug addiction: A review of past research and future directions. *Pharmacology Biochemistry and Behavior*. 2018;164:106–117. Doi: 10.1016/j.pbb.2017.07.013.
 11. Shamsnajafi ZS, Hassanzadeh R, Emadian SO. The Effectiveness of Dialectical Behavior Therapy on Emotional Processing Defects and Impulsivity of Soldiers Aged 18 to 20 Years with High-risk Behaviors. *Modern Care Journal*. 2023;20(3):e135447.DOI: <https://doi.org/10.5812/modernc->.
 12. Strickland JC, Johnson MW. Rejecting impulsivity as a psychological construct: A theoretical, empirical, and sociocultural argument. *Psychological review*. 2021;128(2):336–361. DOI: 10.1037/rev0000263
 13. Ettelt S, Ruhrmann S, Barnow S, Buthz F, Hochrein A, Meyer K, et al. Impulsiveness in obsessive-compulsive disorder: results from a family study. *Acta Psychiatrica Scandinavica*. 2007;115(1):41–47. DOI: 10.1111/j.600-0447.2006.00835.x
 14. Albertella L, Rotaru K, Christensen E, Lowe A, Brierley M-E, Richardson K, et al. The influence of trait compulsivity and impulsivity on addictive and compulsive behaviors during COVID-19. *Frontiers in psychiatry*. 2021;12:634583. <https://doi.org/10.3389/fpsyt.2021>.
 15. Stahl C, Voss A, Schmitz F, Nuszbaum M, Tüscher O, Lieb K, et al. Behavioral components of impulsivity. *Journal of Experimental Psychology: General*. 2014;143(2):850–886. DOI: 10.1037/a0033981
 16. Al-Dababneh KA, Al-Zboon EK. Understanding impulsivity among children with specific learning disabilities in inclusion schools. *Learning Disability Quarterly*. 2018;41(2):100–112. DOI: 10.1177/0731948717726497.
 17. Um M, Hershberger AR, Whitt ZT, Cyders MA. Recommendations for applying a multi-dimensional model of impulsive personality to diagnosis and treatment. *Borderline personality disorder and emotion dysregulation*. 2018;5(1):1–17. <https://doi.org/10.1186/s40479-018-0084-x>.
 18. Flory JD, Harvey PD, Mitropoulou V, New AS, Silverman JM, Siever LJ, et al. Dispositional impulsivity in normal and abnormal samples. *Journal of psychiatric research*. 2006;40(5):438–447. DOI: 10.1016/j.jpsychires.2006.01.008
 19. Herpertz S, Sass H, Favazza A. Impulsivity in self-mutilative behavior: Psychometric and biological findings. *Journal of psychiatric research*. 1997;31(4):451–465. DOI: 10.1016/s0022-3956(97)00004-6
 20. Pan N, Wang S, Zhao Y, Lai H, Qin K, Li J, et al. Brain gray matter structures associated with trait impulsivity: A systematic review and voxel - based meta - analysis. *Human Brain Mapping*. 2021;42(7):2214–2235. doi: 10.1002/hbm.25361.
 21. Heath AC, Cloninger CR, Martin NG. Testing a model for the genetic structure of personality: a comparison of the personality systems of Cloninger and Eysenck. *Journal of personality and social psychology*. 1994;66(4):762–775.DOI: 10.1037//0022-3514.66.4.762
 22. Amini M, Namdari K, Shirani M. Validity and reliability of Eysenck and Murray Impulsivity Scale and Divided Attention Questionnaire (DAQ) in students of University of Isfahan, Iran. *Ment Health*. 2016;3:125–129. Doi:10.22038/jfmh.2016.6870.
 23. Tsatali M, Moraitou D, Papantoniou G, Foutsitzi E, Bonti E, Kougioumtzis G, et al. Measuring impulsivity in Greek adults: psychometric properties of the Barratt impulsiveness scale (BIS-11) and impulsive behavior scale (short version of UPPS-P). *Brain Sciences*. 2021;11(8):1007. DOI: 10.3390/brainsci11081007
 24. Vasconcelos AG, Malloy-Diniz L, Correa H. Systematic review of psychometric proprieties of Barratt Impulsiveness Scale Version 11 (BIS-11). *Clinical neuropsychiatry*. 2012;9(2).
 25. Mokri A, Ekhtiari H, Edalati H, Ganjgahi H, Naderi P. Relationship between craving intensity and risky behaviors and impulsivity factors in different groups of opiate addicts. *Iranian Journal of Psychiatry and Clinical Psychology*. 2008;14(3):258–268.
 26. Garson DG. Factor analysis: statnotes. Retrieved March. 2008;22:2008.
 27. Barratt ES, Stanford MS, Kent TA, Alan F. Neuropsychological and cognitive psychophysiological substrates of impulsive aggression. *Biological psychiatry*. 1997;41(10):1045–1061.
 28. Azizi A, Borjali A, Golzari M. The effectiveness of emotion regulation training and cognitive therapy on the emotional and addictional problems of substance abusers. *Iranian Journal of Psychiatry*. 2010;5(2):60–65.
 29. Simons JS, Gaher RM. The Distress Tolerance Scale: Development and validation of a self-report measure. *Motivation and emotion*. 2005;29: 83–102.
 30. Ellouze F, Ghaffari O, Zouari O, Zouari B, M'rad M. Validation of the dialectal Arabic version of Barratt's

- impulsivity scale, the BIS-11. *L'encephale*. 2012;39(1):13–18.
31. Someya T, Sakado K, Seki T, Kojima M, Reist C, Tang SW, et al. The Japanese version of the Barratt Impulsiveness Scale, 11th version (BIS - 11): Its reliability and validity. *Psychiatry and clinical neurosciences*. 2001;55(2):111–114.
 32. Koo TK, Li MY. A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of chiropractic medicine*. 2016;15(2):155–163. DOI: 10.1016/j.jcm.2016.02.012
 33. Costello AB, Osborne J. Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical assessment, research, and evaluation*. 2005;10(1):7. <https://doi.org/10.7275/jyj1-4868>.
 34. Sarkın DBŞ, Gülleroğlu HD. Anxiety in Prospective Teachers: Determining the Cut-off Score with Different Methods in Multi-Scoring Scales. *Educational Sciences: Theory & Practice*. 2019;19(1): 3–21. DOI 10.12738/estp.2019.1.0116
 35. Ekhtiari H, Safaei H, Esmaeeli Djavid G, Atefvahid MK, Edalati H, Mokri A. Reliability and validity of persian versions of eyenck, barratt, dickman and zuckerman questionnaires in assessing risky and impulsive behaviors. *Iranian journal of psychiatry and clinical psychology*. 2008;14(3):326–336. <https://psycnet.apa.org/record/2009-08650-003>.
 36. Javid M, Mohammadi N, Rahimi C. Psychometric properties of an Iranian version of the Barratt Impulsiveness Scale-11 (BIS-11). *Psychological Methods and Models*. 2012;2(8):23–34.
 37. Bagbanian M, Momayyezi M, Fallahzadeh H, Mirzaei M. Prevalence of Illicit Drug Use and Related Factors in Adults: Results of First Phase of Shahedieh Cohort Study 2015–2016. *Iranian Journal of Epidemiology*. 2022;17(4):353–361.
 38. Hatamkhani S, Shiva A, Pouraghdam R, Nojavan N, Ghasempour M. Study of the pattern of drug use among clients referring to the compulsory maintenance, treatment and reducing the harm of addicts center in Urmia in 1394. *medical journal of mashhad university of medical sciences*. 2018;61(3):1050–1060.
 39. Sadri D, Joleahr M, salehyan s, Haj mostafa zadeh sabagh A. A survey on the pattern of consumption and oral manifestations of a group of addicts in Tehran in 2017. *journal of research in dental sciences*. 2019;16(3):234–244.
 40. Juneja R, Chaiwong W, Siripool P, Mahapol K, Wiriya T, Shannon J, et al. Thai adaptation and reliability of three versions of the Barratt Impulsiveness Scale (BIS 11, BIS-15, and BIS-Brief). *Psychiatry research*. 2019;272:744–755.
 41. Al-Hammouri MM, Rababah J. Psychometric properties of the Arabic version of Barratt Impulsiveness Scale 11: The development of short form. *Archives of Psychiatric Nursing*. 2023.
 42. Victor SE, Glenn CR, Klonsky ED. Is non-suicidal self-injury an “addiction”? A comparison of craving in substance use and non-suicidal self-injury. *Psychiatry research*. 2012;197(1-2): 73–77.
 43. Klonsky ED, Olino TM. Identifying clinically distinct subgroups of self-injurers among young adults: a latent class analysis. *Journal of consulting and clinical psychology*. 2008;76(1): 22.
 44. Rachlin H. *The science of self-control*. The Science of Self-Control: Harvard University Press; 2004.
 45. Spikman JM, Deelman BG, van Zomeren AH. Executive functioning, attention and frontal lesions in patients with chronic CHI. *Journal of Clinical and Experimental Neuropsychology*. 2000;22(3): 325–338.