ZIEMBA, Michał, EJSMONT-SOWAŁA , Karolina, HAKAŁO, Dominika, IGNATIUK-CHILKIEWICZ , Marta, KAŁUSKA, Joanna, NOWICKA, Katarzyna, KLIMEK, Wiktor, SOKÓŁ , Aleksandra, MOŚCISZKO, Klaudia and MAJEWSKA, Maria. Promotion of alcohol on social media as a factor hindering the process of addiction treatment. Quality in Sport. 2025;40:59584. eISSN 2450-3118.
https://doi.org/10.12775/QS.2025.40.59584
https://apcz.umk.pl/QS/article/view/59584

The journal has been 20 points in the Ministry of Higher Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Higher Education and Science of 05.01.2024. No. 32553.
Has a Journal's Unique Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).
Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 r. Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398.
Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).

The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 18.03.2025. Revised: 21.03.2025. Accepted: 04.04.2025 Published: 10.04.2025.

Promotion of alcohol on social media as a factor hindering the process of addiction treatment

Ejsmont-Sowała Karolina
0000-0002-0123-3784
ejsmont.karolina@gmail.com
University Clinical Hospital in Bialystok ul. M. C. Skłodowskiej 24a, 15-276 Białystok, Poland

Ziemba Michał
0009-0003-2200-431X
michal.ziemba98@gmail.com
University Clinical Hospital in Bialystok ul. M. C. Skłodowskiej 24a, 15-276 Białystok, Poland

Hakało Dominika
0009-0004-9363-8747
d.hakalo@wp.pl
University Clinical Hospital in Bialystok ul. M. C. Skłodowskiej 24a, 15-276 Białystok, Poland

Ignatiuk-Chilkiewicz Marta
0009-0005-7002-0829
m.ignatiuk.chilkiewicz@gmail.com
University Clinical Hospital in Bialystok ul. M. C. Skłodowskiej 24a, 15-276 Białystok, Poland

Kałuska Joanna
0009-0003-3500-9494
joannakaluska03@gmail.com
Independent Public Healthcare Complex in Minsk Mazowiecki, Szpitalna 37, 05-300 Minsk Mazowiecki

Nowicka Katarzyna
0009-0006-5472-9157
knowicka171@gmail.com
Regional Health Center in Kartuzy, Ceynowy 7, 83-300 Kartuzy

Klimek Wiktor
0009-0006-6271-799X
klimekwiktor@gmail.com
Regional Health Center in Kartuzy, Ceynowy 7, 83-300 Kartuzy

Sokół Aleksandra
0009-0008-9707-9179
ola.sokol24@gmail.com
University Clinical Hospital in Bialystok ul. M. C. Skłodowskiej 24a, 15-276 Białystok, Poland

Mościszko Klaudia
0009-0001-4919-6898
klaudiamosciszko@gmail.com
University Clinical Hospital in Bialystok ul. M. C. Skłodowskiej 24a, 15-276 Białystok, Poland

Majewska Maria
0009-0003-3236-8950
marysia.majewska.117@gmail.com
Medical University of Bialystok ul.J.Kilińskiego 1, 15-089 Białystok, Poland

Abstract
Introduction: Alcohol consumption is still high. We can distinguish people who drink heavily, binge drink or people diagnosed with AUD. These people have to fight against unabated temptations during the treatment of their addiction. We decided to check whether exposure to alcohol advertisements in the media actually has a negative impact on the process of treating alcoholism.
Materials and methods: A review of chosen literature from PubMed, and Google Scholar was conducted, using key words including "alcohol", "advertising", "marketing" "social media", "addiction".
Summary: Nowadays, the Internet and its resources seem to make life easier, but they can often put us to the test when we watch advertisements that affect our brain. Unfortunately, more and more alcohol advertisements can be found in the broadly understood media.

When advertisements, and especially alcohol advertisements, affect the reward system in the brain in the same way as alcohol consumption itself, people undergoing therapy have to do titanic work to be able to push away these temptations.
Conclusions: The found works on the mechanism of alcohol addiction, as well as the impact of advertisements on human thinking and brain allowed us to conclude that alcohol advertising can indeed hinder the process of treating addiction to this substance. At the same time, we want to emphasize that there is a lack of research that would examine the impact of these advertisements directly on people already in therapy. Despite such extensive knowledge about this disease, there is still a scientific gap, the filling of which would help in the therapy of people addicted to alcohol.

Keywords: "alcohol", "advertising", "marketing" "social media", "addiction"

Introduction

Alcohol consumption ranks as the third most significant preventable cause of disease, following smoking and hypertension [1]. Studies that consider the overall harm caused by drugs, including harm to both users and others, identify alcohol as the most harmful substance [2]. Globally, alcohol misuse is the leading risk factor for death and disability among individuals aged 15 to 19 [3]. In 2016, alcohol use was responsible for 2.8 million deaths, accounting for 2.2% of age-standardized deaths in females and 6.8% in males. In terms of overall disease burden, alcohol use led to 1.6% of total disability-adjusted life years (DALYs) globally among females and 6.0% among males in the same year [4].The burden of alcohol-related diseases is partly driven by acute intoxication, which impairs reaction time, perception, motor skills, and inhibitions, leading to a higher risk of traffic accidents, self-inflicted injuries, suicide, falls, drownings, alcohol poisoning, and interpersonal violence [5]. Around 1 in 12 adults report heavy alcohol consumption, defined as more than 3 drinks per day for men or more than 2 drinks per day for women, or binge drinking, which involves consuming more than 5 drinks for men or more than 4 drinks for women within 2 hours [6]. In addition, long-term alcohol use contributes to the disease burden through its association with various medical conditions (e.g., cancer, cardiovascular disease, and liver cirrhosis) and psychiatric disorders (e.g., depression and alcohol use disorder [AUD]) [5]. Alcohol addiction is a chronic condition characterized by cycles of relapse and remission [7]. In the United States, roughly one-third of adults will meet the criteria for alcohol use disorder at some point in their lives [8]. Research indicates that men are at greater risk for alcohol use and addiction compared to women [9]. Alcohol use disorder imposes a significant burden of disease, disability, and premature mortality, particularly in high-income countries [10]. Moderate-to-severe AUD is associated with a reduction in life expectancy by an average of 20 to 30 years [11]. Despite this, only about 25% of individuals with alcoholism ever receive treatment, and for those who do, there is an average delay of about a decade between meeting diagnostic criteria and receiving care [12]. In the United States, primary care physicians often view existing treatments for substance misuse as less effective than treatments for other common medical conditions. This perception contributes to a lack of awareness about diagnostic indicators of substance use disorders and reluctance to address these issues with patients, even when there is clear evidence of a disorder [13].

In many countries, alcohol advertisements have been shown to contribute to increased alcohol consumption and promote unhealthy drinking patterns [14,15]. Exposure to alcohol marketing is linked to an earlier age of drinking initiation, a higher likelihood of starting to drink, and greater drinking intensity among current drinkers [16,17]. Implementing restrictions on alcohol marketing has proven effective in reducing its appeal, particularly among vulnerable populations [18]. Given the increased risk of alcohol consumption due to exposure to alcohol advertising in the media, we decided to analyze the impact of exposure to this content on the ongoing treatment process of alcohol dependence based on the available literature. This is a significant problem that may affect the effectiveness of therapy for people addicted to alcohol.

Mechanism and Diagnosis of Alcohol Use Disorder

AUD is defined by a loss of control over alcohol consumption, accompanied by changes in brain regions involved in motivated behavior, stress regulation, and emotional control, including the midbrain, limbic system, prefrontal cortex, and amygdala. Both positive and negative reinforcement mechanisms contribute significantly to drinking behavior. Positive reinforcement stems from the rewarding and pleasurable effects of alcohol, while negative reinforcement arises from the relief of negative emotional or physiological states through alcohol consumption [19,20]. At the neurotransmitter level, the positive reinforcing effects of alcohol are primarily driven by dopamine, opioid peptides, serotonin, γ-aminobutyric acid (GABA), and endocannabinoids. In contrast, negative reinforcement involves increased activation of the corticotropin-releasing factor and glutamatergic systems, along with a reduction in GABA transmission [20]. Prolonged alcohol exposure leads to adaptive changes in several neurotransmitter systems, including GABA, glutamate, and norepinephrine, among others. When alcohol consumption ceases, these adaptations contribute to nervous system hyperactivity and dysfunction, which are hallmarks of alcohol withdrawal [19,20].

In 2013, the American Psychiatric Association issued new guidelines in the Diagnostic and Statistical Manual for Mental Disorders, 5th edition (DSM-5) for the diagnosis of alcohol use disorders. In this edition, alcohol use disorders and alcohol dependence were combined under the term alcohol use disorder (AUD). Alcohol use disorders can be diagnosed based on meeting at least 2 of the 11 criteria (Table I). The severity of the disorder depends on the results, that is, 2-3 criteria met are mild, 4-5 are moderate, and 6 or more are severe [21].

DSM-5 criteria for AUD
• Alcohol is often taken in larger amounts or over a longer period than was intended.
• There is a persistent desire or unsuccessful efforts to cut down or control alcohol use.
• A great deal of time is spent in activities necessary to obtain alcohol, use alcohol, or recover from its effects.
• Craving, or a strong desire or urge to use alcohol.
• Recurrent alcohol use resulting in a failure to fulfill major role obligations at work, school, or home.
• Continued alcohol use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of alcohol.
• Important social, occupational, or recreational activities are given up or reduced because of alcohol use.
• Recurrent alcohol use in situations in which it is physically hazardous.
• Alcohol use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by alcohol.
• Tolerance, as defined by either of the following: a. A need for markedly increased amounts of alcohol to achieve intoxication or desired effect. b. A markedly diminished effect with continued use of the same amount of alcohol.
• Withdrawal, as manifested by either of the following: a. At least two withdrawal symptoms (e.g., malaise, insomnia, psychomotor agitation). b. Alcohol (or a closely related substance, such as a benzodiazepine) is taken to relieve or avoid withdrawal symptoms.

Table I. Diagnostic Criteria of Alcohol Use Disorder, based on the American Psychiatric Association, DSM-5 [21]

Promotion of alcohol on social media

Social media platforms have become an integral part of everyday life. With billions of users, they serve as powerful tools for influencers, brands and advertisers to reach large audiences [22]. A growing concern is how alcohol brands and influencers are promoting alcoholic beverages on social media platforms. This type of marketing often targets younger, impressionable audiences [23, 24]. Concerns are also raised about the lack of adherence to regulations. The age verification process in online alcohol advertising is essential for protecting young people from exposure to alcohol-related content, however these systems are often ineffective [25]. Frequent appearances of alcohol-related content in a user's social media feed can strengthen positive associations with alcohol [26]. Social media advertising contributes to the normalization of drinking, especially when alcohol is presented in a celebratory or social context. Seeing peers and celebrities post about alcohol use creates a perception that drinking is an essential part of socializing and having fun. This can lead to higher levels of engagement with alcohol-related content and, ultimately, a greater likelihood of alcohol use [25].

Social media platforms also offer more than just exposure to alcohol-related content. Users not only passively consume information shared by others, but they also have the ability to actively create content and engage in behaviors in response to what others post. Posting about alcohol or interacting with others alcohol-related posts encourage alcohol consumption, especially when rewards e.g. likes are offered [27]. For individuals already struggling with alcohol use disorder, exposure to such advertisements can also have a significant impact on their treatment outcome. Alcohol advertising can create mental and emotional triggers that complicate recovery efforts [28].

Adolescents with AUD criteria have higher brain responsiveness when exposed to alcohol stimuli like alcohol images than nonabusive teens [29]. As the severity of the AUD increased, patients felt less confident in their ability to manage alcohol cravings and their urge to drink after viewing alcohol advertisements [30]. Studies confirm that craving is a precursor to relapse among alcoholics in treatment [31]. Promoting alcohol on social media raises significant concerns regarding public health, ethics and legal compliance.

Treatment of Alcohol Use Disorder and the impact of Alcohol Advertising on this process

One of the most popular and most effective methods of treating AUD is therapy, which can take the form of individual or group therapy, and the type of therapy is not clearly assigned to this form of treatment. This method definitely focuses on the individual person and their needs. Another popular therapy is the 12-step method implemented with a caregiver and based on trust [32]. Pharmacology also finds its application in the treatment of this disease. The oldest drug registered by the U.S. Food and Drug Administration (FDA) used in the treatment of alcohol addiction is disulfiram. The reaction it causes together with ethanol can be off-putting for patients [33]. One of the options for administering the drug is its subcutaneous administration [34]. This route of administration is also available in the case of another drug - naltrexone. Its extended release has had a positive effect in studies [33]. Studies have also been conducted on the combination of naltrexone with gabapentin, which is an antiepileptic drug, but is used off-label in the treatment of alcohol addiction. The results of these studies were successful, especially for people who had a relapse [35]. The study on the combination of naltrexone and acamprosate showed unsatisfactory results [36]. Acamprosate alone has varied results in studies. There are studies in the USA proving its therapeutic effect, and it is also indicated alongside naltrexone as a first-line drug, but studies in Europe or Australia have not confirmed its effectiveness [33, 37]. In Europe, in addition to disulfiram, naltrexone and acamprosate, nalmefene is also registered, which is the first drug approved by the European Medicines Agency (EMA). It is effective in people without additional aggravating factors, for example, without a family history of alcohol addiction, as well as in patients who, in addition to alcohol addiction, also suffer from a mental illness [38].

Relapse is a challenging and common part of alcohol addiction treatment [39]. Despite the availability of various therapeutic interventions, multiple factors contribute to setbacks in the recovery process [40].

Factors contributing to alcohol treatment failure and dropout include patient-related issues (e.g. young age, female gender, social isolation, low socioeconomic status and low motivation, advanced alcoholism, more prior treatment attempts, history of crime and personality disorder) and treatment factors (e.g. mismatched programs, court mandate, therapist qualities). Short treatment durations also can lead to insufficient progress, causing patients to drop out early [41]. Factor that may also influence relapse is exposure to alcohol-related stimuli i.e. alcohol advertising [28]. The key to overcoming the causes of treatment failure is a comprehensive, personalized approach that addresses the physical, psychological, social and environmental factors influencing addiction. Addiction treatment must be multifaceted, with long-term support systems in place to ensure lasting recovery [42].

The authors of the advertisements use various neuromarketing techniques to make their actions effective. They are based on predicting the psychological and physiological reactions of the recipients of these advertisements. These techniques use for instance EEG or fMRI studies [43]. Thanks to this, it was noticed that the inferior frontal gyrus and the middle temporal gyrus were associated with the experience of pleasant and unpleasant emotions, respectively [44]. Moreover, the right and left prefrontal cortex were associated with withdrawal and approach behaviors [45]. When it comes to the reward system, the ventral striatum played a key role [46]. Many researchers are looking into the issue of neuromarketing, which is undoubtedly extensive. While using these techniques in health campaigns is commendable, using them in advertisements promoting alcohol is at least ethically questionable.

People who abuse alcohol may be particularly susceptible to alcohol marketing. Research on the relationship between such exposure and alcohol consumption in population with AUD remains limited. However, existing studies have often centered on heavy alcohol users—those who consume alcohol beyond recommended limits. These individuals exhibit heightened responses to alcohol-related cues, with increased alcohol consumption linked to greater focus on such cues, potentially intensifying subjective alcohol cravings [47,48]. Compared to their non-heavy drinking counterparts, young heavy drinkers not only observed higher levels of alcohol consumption in advertisements but also considered this behavior to be responsible unless it appeared excessive [49]. A 2014 study on 74 detoxified abstinent inpatients who fulfilled diagnostic criteria for alcohol dependence according to the DSM-IV demonstrated that AUD patients who displayed a stronger appetitive response to alcohol-associated images (measured through an attenuated startle response) had shorter periods of abstinence [50]. Research has also explored the broader environmental factors that may influence AUD, such as neighborhood alcohol outlet density, revealing complex relationships between exposure to alcohol-related stimuli and the risk or recurrence of AUD. A 2018 study found that residing in a neighborhood with at least one alcohol outlet of any kind was linked to a slight increase in the risk of developing AUD. However, for individuals with a prior AUD diagnosis, the presence of an alcohol outlet in the neighborhood was not significantly associated with AUD recurrence [51].

Conclusions

Targeting the brain's reward system enhances the effectiveness of advertisements, particularly among individuals vulnerable to alcohol, such as those with AUD. Alcohol advertisements can trigger psychological and emotional responses in people struggling with addiction, intensifying cravings-a key factor contributing to relapse. Individuals with AUD exhibit heightened sensitivity to alcohol-related cues, which undermines their ability to control the impulse to drink when exposed to such advertisements. However, research on this topic focused on people undergoing therapy remains limited. Further studies are needed to confirm this hypothesis and determine at which stage of therapy alcohol advertisements have the greatest impact on patients. In contrast to advertisements, the mere presence of alcohol outlets does not appear to significantly hinder the ability to maintain abstinence. By understanding the mechanisms through which alcohol promotion influences individuals and implementing effective strategies to address the issue, we can create a more supportive environment for recovery.

Disclosure

Author's contribution

Conceptualization: Michał Ziemba, Karolina Ejsmont-Sowała, Wiktor Klimek
Methodology: Marta Ignatiuk-Chilkiewicz, Joanna Kałuska, Maria Majewska, Klaudia Mościszko
Formal analysis: Dominika Hakało Katarzyna Nowicka
Investigation: Dominika Hakało, Karolina Ejsmont-Sowała, Wiktor Klimek
Writing-roughpreparation: Michał Ziemba, Joanna Kałuska, Marta Ignatiuk-Chilkiewicz
Writing-review and editing: Dominika Hakało, Karolina Ejsmont-Sowała, Joanna Kałuska, Michał Ziemba, Katarzyna Nowicka, Wiktor Klimek, Maria Majewska, Klaudia Mościszko, Aleksandra Sokół
Supervision: Karolina Ejsmont-Sowała, Aleksandra Sokół

All authors have read and agreed with the published version of the manuscript.

Financing statement

This research received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

Not applicable.

Conflict of interest

The authors deny any conflict of interest.

References

[1] Singal AK, Anand BS. Recent trends in the epidemiology of alcoholic liver disease. *Clin Liver Dis (Hoboken)* 2013; 2(2):53-56. Published 2013 Apr 24. https://doi.org/10.1002/cld.168

[2]Nutt DJ, King LA, Phillips LD; Independent Scientific Committee on Drugs. Drug harms in the UK: a multicriteria decision analysis. *Lancet* 2010; 376(9752): 1558-1565. https://doi.org/10.1016/S0140-6736(10)61462-6"1016/S0140-6736(10)61462-6

[3] Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *The Lancet* 2012; 380(9859): 2224-2260. https://doi.org/10.1016/S0140-6736(12)61766-8

[4] GBD 2016 Alcohol Collaborators. Alcohol use and burden for 195 countries and territories, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet* 2018;392(10152):1015-1035. https://doi.org/10.1016/S0140-6736(18)31310-2

[5] Collins SE. Associations Between Socioeconomic Factors and Alcohol Outcomes. *Alcohol Res* 2016;38(1):83-94.

[6] Rehm J, Gmel GE Sr, Gmel G, et al. The relationship between different dimensions of alcohol use and the burden of disease-an update. *Addiction* 2017;112(6):968-1001.https://doi.org/10.1111/add.13757

[7] McLellan AT, Lewis DC, O'Brien CP, Kleber HD. Drug dependence, a chronic medical illness: implications for treatment, insurance, and outcomes evaluation. *JAMA* 2000;284(13):1689-1695.https://doi.org/10.1001/jama.284.13.1689

[8] Grant BF, Goldstein RB, Saha TD, et al. Epidemiology of DSM-5 Alcohol Use Disorder: Results From the National Epidemiologic Survey on Alcohol and Related Conditions III. *JAMA Psychiatry* 2015;72(8):757-766. https://doi.org/10.1001/jamapsychiatry.2015.0584

[9] Ilhan MN, Arikan Z, Kotan Z, et al. Prevalence and Socio-Demographic Determinants of Tobacco, Alcohol, Substance Use and Drug Misuse in General Population in Turkey. *Noro Psikiyatr Ars* 2016;53(3):205-212.https://doi.org/10.5152/npa.2015.10050

[10] Stahre M, Roeber J, Kanny D, Brewer RD, Zhang X. Contribution of excessive alcohol consumption to deaths and years of potential life lost in the United States. *Prev Chronic Dis* 2014;11:E109. Published 2014 Jun 26. https://doi.org/10.5888/pcd11.130293"://doi.org/10.5888/pcd11.130293

[11] Rosenbaum BP, Kshettry VR, Kelly ML, Weil RJ. Diagnoses associated with the greatest years of potential life lost for in-hospital deaths in the United States, 1988-2010. *Public Health* 2015;129(2):173-181.https://doi.org/10.1016/j.puhe.2014.11.011

[12] Hasin DS, Stinson FS, Ogburn E, Grant BF. Prevalence, correlates, disability, and comorbidity of DSM-IV alcohol abuse and dependence in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Arch Gen Psychiatry* 2007;64(7):830-842.https://doi.org/10.1001/archpsyc.64.7.830

[13] Johnson TP, Booth AL, Johnson P. Physician beliefs about substance misuse and its treatment: findings from a U.S. survey of primary care practitioners. *Subst Use Misuse* 2005;40(8):1071-1084.https://doi.org/10.1081/JA-200030800

[14] Hollingworth W, Ebel BE, McCarty CA, Garrison MM, Christakis DA, Rivara FP. Prevention of deaths from harmful drinking in the United States: the potential effects of tax increases and advertising bans on young drinkers. *J Stud Alcohol* 2006;67(2):300-308.https://doi.org/10.15288/jsa.2006.67.300
[15] Esser MB, Jernigan DH. Policy Approaches for Regulating Alcohol Marketing in a Global Context: A Public Health Perspective. *Annu Rev Public Health* 2018;39:385-401.https://doi.org/10.1146/annurev-publhealth-040617-014711
[16] Jernigan D, Noel J, Landon J, Thornton N, Lobstein T. Alcohol marketing and youth alcohol consumption: a systematic review of longitudinal studies published since 2008. *Addiction* 2017;112 Suppl 1:7-20.https://doi.org/10.1111/add.13591
[17] Chang FC, Lee CM, Chen PH, et al. Using media exposure to predict the initiation and persistence of youth alcohol use in Taiwan. *Int J Drug Policy* 2014;25(3):386-392. https://doi.org/10.1016/j.drugpo.2014.04.017"s://doi.org/10.1016/j.drugpo.2014.04.017
[18] Babor TF, Jernigan D, Brookes C, Brown K. Toward a public health approach to the protection of vulnerable populations from the harmful effects of alcohol marketing. *Addiction* 2017;112 Suppl 1:125-127.https://doi.org/10.1111/add.13682
[19] Koob GF. Alcoholism: allostasis and beyond. *Alcohol Clin Exp Res* 2003;27(2):232-243.https://doi.org/10.1097/01.ALC.0000057122.36127.C2
[20] Koob GF, Volkow ND. Neurobiology of addiction: a neurocircuitry analysis. *Lancet Psychiatry* 2016;3(8):760-773.https://doi.org/10.1016/S2215-0366(16)00104-8
[21] American Psychiatric Association, DSM-5 Task Force. (2013). Diagnostic and statistical manual of mental disorders: DSM-5™ (5th ed.). American Psychiatric Publishing, Inc..https://doi.org/10.1176/appi.books.9780890425596
[22] Niland P., McCreanor T., Lyons A. C. & Griffin C. Alcohol marketing on social media: young adults engage with alcohol marketing on facebook. *Addict Res Theory* 2016; *25*(4), 273–284. https://doi.org/10.1080/16066359.2016.1245293
[23] Moreno M. A. & Whitehill, J. M. Influence of Social Media on Alcohol Use in Adolescents and Young Adults. *ARCR* 2014; *36*(1), 91–100.
[24] Grenard J. L., Dent C. W. & Stacy A. W. Exposure to alcohol advertisements and teenage alcohol-related problems. *Pediatrics* 2013; *131*(2), e369–e379. https://doi.org/10.1542/peds.2012-1480
[25] Critchlow N., MacKintosh A. M., Hooper L., Thomas C. & Vohra, J. Participation with alcohol marketing and user-created promotion on social media, and the association with higher-risk alcohol consumption and brand identification among adolescents in the UK. *Addict. Res. Theory.* 2019; *27*(6), 515–526. https://doi.org/10.1080/16066359.2019.1567715
[26] Groth G. G., Longo L. M. & Martin J. L. Social media and college student risk behaviors: A mini-review. *Addict Behav* 2017; *65*, 87–91. https://doi.org/10.1016/j.addbeh.2016.10.003
[27] Alhabash S., Park S., Smith S., Hendriks H., & Dong Y. Social Media Use and Alcohol Consumption: A 10-Year Systematic Review. *Int J Environ Res Public Health* 2022; *19*(18), 11796. https://doi.org/10.3390/ijerph191811796
[28] Witteman J., Post H., Tarvainen M. et al. Cue reactivity and its relation to craving and relapse in alcohol dependence: a combined laboratory and field study. *Psychopharmacology* 2015; *232*(20), 3685–3696. https://doi.org/10.1007/s00213-015-4027-6

[29] Tapert S. F., Cheung E. H., Brown G. G. et al. Neural response to alcohol stimuli in adolescents with alcohol use disorder. *Arch Gen Psychiatry* 2003; *60*(7), 727–735. https://doi.org/10.1001/archpsyc.60.7.727
[30] Guillou-Landreat M., Dany A., Le Reste J. et al. Impact of alcohol marketing on drinkers with Alcohol use disorders seeking treatment: a mixed-method study protocol. *BMC public health* 2020; *20*(1), 467. https://doi.org/10.1186/s12889-020-08543-6
[31] Litt M. D., & Cooney N. L. Inducing craving for alcohol in the laboratory. *Alcohol Res Health* 1999; *23*(3), 174–178.
[32] Flanagan JC, Jones JL, Jarnecke AM, Back SE. Behavioral Treatments for Alcohol Use Disorder and Post-Traumatic Stress Disorder. *Alcohol Res.* 2018; 39(2):181-192.
[33] Kranzler HR. Overview of Alcohol Use Disorder. *Am J Psychiatry* 2023; 180(8): 565–572. https://doi.org/10.1176/appi.ajp.20230488
[34] Lanz J, Biniaz-Harris N, Kuvaldina M, Jain S, Lewis K, Fallon BA. (2023). Disulfiram: Mechanisms, Applications, and Challenges. *Antibiotics* 2023; 12(3): 524. https://doi.org/10.3390/antibiotics12030524
[35] Anton RF, Myrick H, Wright TM, et al. Gabapentin combined with naltrexone for the treatment of alcohol dependence. *Am J Psychiatry* 2011; 168: 709–717. https://doi.org/10.1176/appi.ajp.2011.10101436
[36] Anton RF, O'Malley SS, Ciraulo DA, et al. Combined Pharmacotherapies and Behavioral Interventions for Alcohol Dependence: The COMBINE Study: A Randomized Controlled Trial. *JAMA* 2006; 295(17): 2003–2017. doi:10.1001/jama.295.17.2003
[37] McPheeters M, O'Connor EA, Riley S, et al. Pharmacotherapy for Alcohol Use Disorder: A Systematic Review and Meta-Analysis. *JAMA* 2023; 330(17): 1653–1665. doi:10.1001/jama.2023.19761
[38] Stokłosa I, Więckiewicz G, Stokłosa M, Piegza M, Pudlo R, Gorczyca P. Medications for the treatment of alcohol dependence—current state of knowledge and future perspectives from a public health perspective. *Int. J. Environ. Res. Public Health* 2023; 20(3): 1870. doi:10.3390/ijerph20031870
[39] Sinha R. The role of stress in addiction relapse. *Curr Psychiatry Rep* 2007; *9*(5), 388–395. https://doi.org/10.1007/s11920-007-0050-6
[40] Sliedrecht W., de Waart R., Witkiewitz K., &Roozen H. G. Alcohol use disorder relapse factors: A systematic review. *Psychiatry Res 2019;278*, 97–115. https://doi.org/10.1016/j.psychres.2019.05.038
[41] Brorson H. H., Ajo Arnevik E., Rand-Hendriksen K., &Duckert F. Drop-out from addiction treatment: a systematic review of risk factors. *Clin Psychol Rev 2013*; *33*(8), 1010–1024. https://doi.org/10.1016/j.cpr.2013.07.007
[42] Inanlou M., Bahmani B., Farhoudian A., & Rafiee F. Addiction Recovery: A Systematized Review. *Iran J Psychiatry 2020*, *15*(2), 172–181.
[43] Alsharif AH, Salleh NZM, Alrawad M. et al. Exploring global trends and future directions in advertising research: A focus on consumer behavior. *Curr Psychol* 2024; 43: 6193–6216. https://doi.org/10.1007/s12144-023-04812-w
[44] Shen F, Morris JD. Decoding neural responses to emotion in television commercials. *J. Advert. Res.*2016; 56(2): 11–28. https://doi.org/10.2501/jar-2016-016

[45] Cherubino P, Maglione AG, Graziani I, Trettel A, Vecchiato G, Babiloni F. Measuring cognitive and emotional processes in retail: A neuroscience perspective. In: Cherubino P, Maglione AG, Graziani I, Trettel A, Vecchiato G, Babiloni F. *Successful technological integration for competitive advantage in retail settings*. IGI Global; 2015, p. 76-92. doi: 10.4018/978-1-4666-8297-9.ch004
[46] Galvan A. Adolescent development of the reward system. *Front. hum. neurosci.*2010; 4(6): 1–9. https://doi.org/10.3389/neuro.09.006.2010
[47] Cox WM, Pothos EM, Hosier SG. Cognitive-motivational predictors of excessive drinkers' success in changing. *Psychopharmacology (Berl)* 2007;192(4):499-510. https://doi.org/10.1007/s00213-007-0736-9
[48] Field M, Cox WM. Attentional bias in addictive behaviors: a review of its development, causes, and consequences. *Drug Alcohol Depend* 2008; 97(1-2):1-20.https://doi.org/10.1016/j.drugalcdep.2008.03.030
[49] Noel JK, Xuan Z, Babor TF. Perceptions of Alcohol Advertising among High Risk Drinkers. *Subst Use Misuse* 2018; 53(9):1403-1410. https://doi.org/10.1080/10826084.2017.1409765
[50] Leménager T, Hill H, Reinhard I, et al. Association between alcohol-cue modulated startle reactions and drinking behaviour in alcohol dependent patients - results of the PREDICT study. *Int J Psychophysiol* 2014; 94(3):263-271.https://doi.org/10.1016/j.ijpsycho.2014.09.009
[51] Karriker-Jaffe KJ, Ohlsson H, Kendler KS, Cook WK, Sundquist K. Alcohol Availability and Onset and Recurrence of Alcohol Use Disorder: Examination in a Longitudinal Cohort with Cosibling Analysis. *AlcoholClinExp Res* 2018; 42(6):1105-1112. https://doi.org/10.1111/acer.13752