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ORIGINAL RESEARCH

The Impact of Gambling Advertising Perception on the Development of Gambling Addiction: Mediating and Moderating Effects

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Abstract

This study aims to identify the influence of gambling advertising perceptions on the development of gambling addiction, focusing on the mediating role of behavioral impulse and the moderating function of risk awareness. With the growing digitalization of gambling services and increasing advertising pressure, especially among youth audiences, there is a growing need for a comprehensive analysis of the mechanisms of marketing content exposure. The methodological model includes four hypotheses: the influence of advertising on impulsivity (H1), the influence of impulsivity on addiction (H2), the mediating effect of impulsivity (H3) and the moderating role of risk awareness (H4). Data were collected in 20 regions of Kazakhstan among 530 respondents with signs of addiction. PLS-SEM model was applied. The results indicate a significant mediation of impulse and mitigating effect of risk awareness. The findings are important for regulation and prevention of gambling addiction.

Keywords: gambling advertising, addiction, impulsivity, risk awareness, PLS-SEM, Kazakhstan

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Introduction

In recent decades, participation in gambling has become a widespread phenomenon in many countries, including the Republic of Kazakhstan. One of the driving forces behind this spread is the aggressive marketing policy of gambling operators, which is particularly active in the digital space — through social networks, push notifications, messengers and online broadcasts. Such advertising positions gambling not as a risk, but as part of socially approved leisure activities, forming a positive perception in users and reducing awareness of the consequences.

In parallel with the global spread of online gambling, concerns about its consequences are growing. The situation is particularly alarming among young people and working-age men, for whom betting and gambling become part of the everyday digital experience. Kazakhstan is of particular interest in this context: on the one hand, legalization and economic growth stimulate the development of the gambling sector; on the other hand, there is a lack of comprehensive regulation of online advertising and preventive support systems for people with gambling addiction. Despite the growing academic interest in the topic, most of the existing studies are based on data from Western countries and do not take into account the cultural, behavioral and economic characteristics of post-Soviet societies. Current research highlights that advertising can reinforce risky behavioural patterns and act as a factor in the engagement of individuals with no previous interest in gambling (Hing et al., 2018; Russell et al., 2023). Moreover, exposure to advertising messages can activate a behavioural impulse that leads to uncontrolled betting. Behavioural impulse, in turn, is considered as an intermediate link in the formation of gambling addiction, and critical perception and risk awareness as possible buffering factors.

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Thus, the present study attempts to fill two gaps: (1) to test empirically a mediated model that explains how advertising perception influences addiction through behavioural impulse, and (2) to identify the moderating effect of risk awareness in these relationships. The analysis was conducted on a representative sample of 530 players from different regions of Kazakhstan, using PLS-SEM, one of the most advanced structural modelling tools.

However, the question remains insufficiently explored: through what mechanisms does advertising influence the formation of addiction? The role of awareness as a possible buffer is also neglected.

Theoretical background and literature review

Gambling advertising affects cognitive distortions and normalizes risk-taking behaviour. Hing et al. (2018) showed that advertising stimuli, especially in digital form (SMS, push notifications, bonuses), elicit immediate impulsive betting. Russell et al. (2023) confirmed that perceptions of advertising messages are associated with increased frequency of betting participation, especially among young people.

Behavioural impulse acting as a mediator is a key predictor of the development of gambling addiction. This is consistent with the stimulus-organism-response (S-O-R) model, in which advertising stimuli (S) activate internal psychophysiological responses (O), leading to gambling behaviour (R).

Pitt et al. (2017) found that children's exposure to gambling advertisements was significantly associated with more favorable attitudes toward gambling and increased consumption intentions. Impulsivity in adolescents and young adults is considered a consistent predictor of gambling involvement (Ioannidis et al., 2019).

Risk awareness acts as a potential moderator in this relationship. As shown in Gainsbury et al. (2020), participants with high levels of critical awareness of advertising displayed a lower propensity for impulsive betting. This suggests a buffering role for mindfulness and media literacy in advertising exposure conditions. Young people (18–24 years old) are considered the most vulnerable: they are often exposed to massive advertising of sports betting and online casinos through television, internet and social media (Rossi et al., 2021). Gambling advertisements often present gambling as an exciting and safe pastime, thereby normalising risk-taking behaviour and shaping positive attitudes towards gambling among audiences. However, the exact contribution of advertising to the promotion of gambling behaviour and the development of addictive patterns remains a subject of active research.

One of the putative psychological mechanisms of advertising influence is the enhancement of the behavioural impulse to gamble by the spontaneous urge to bet money without thinking about the consequences. Behavioural impulsivity has long been recognized as a significant risk factor for addictive behaviour and its role has been extensively studied in the context of pathological gambling (Mestre-Bach et al., 2020; Ioannidis et al., 2019). Meanwhile, gambling addiction (gambling addiction) — a clinical disorder characterized by compulsive gambling participation, loss of control and escalating negative consequences — is often associated with increased impulsivity and reduced risk sensitivity (Spurrier & Blaszczynski, 2014). In turn, risk awareness — an individual's understanding of the realistic probabilities of losing and the potential harms of gambling — can play a protective role by moderating impulsive decisions. This literature review aims to analyze current research on four interrelated aspects: (1) the influence of gambling advertising on players' behavioural impulses; (2) the influence of impulsivity on the formation of gambling addiction; (3) the indirect nature of advertising influence (through impulsive behaviour); and (4) the role of risk awareness. Based on the results of the critical analysis of the literature, the relevant hypotheses of the study are formulated for further empirical testing.

Theoretical background

Gambling advertising refers to any marketing promotion of gambling products and services, from television spots and internet banners to sponsorship of sporting events. Studies have documented the explosive growth of such advertising: in one country, for example, gambling companies' advertising expenditure grew by almost 50 per cent in a year. Adverts full of enticing messages (e.g., free bets, high odds) create an illusion of easy winnings and reduce risk perception (Deans et al., 2017).

In psychology, impulsivity is defined as the tendency to act in haste, without due consideration of the consequences. Impulsive individuals are characterized by difficulty in restraining immediate impulses and a preference for instant gratification, even if it involves great risk. Impulsivity is considered a key personality factor that increases vulnerability to gambling problems (Chamberlain et al., 2019). Theoretical models partition impulsivity into components (cognitive hurry, inhibition deficits, preference for immediate rewards, etc.), and on all of these dimensions, individuals with gambling addiction show higher scores than control

groups. Thus, impulsive behaviour serves as an important basis for the emergence and perpetuation of gambling habits.

Pathological gambling is recognized as a form of behavioural addiction comparable in its manifestations to chemical addictions. The DSM-5 and ICD-11 classify it as "gambling disorder," a disorder in which a person loses control over gambling, continues to gamble despite severe consequences, and experiences psychological dependence and withdrawal-like symptoms. Gambling addiction is associated with serious personal, family and socio-economic problems: it causes deterioration of mental health, conflicts in relationships, debts, up to bankruptcy. Current estimates of the prevalence of problem gambling range from 1–3 % of the adult population, with young males at highest risk (Calado et al., 2017). A significant feature of ludomaniacs is the presence of associated impulsive-cognitive dysfunction — increased impulsivity, deficits in self-control, and cognitive distortions about winning and chance (Spurrier & Blaszczynski, 2014). These characteristics both predispose to the development of addiction and worsen as addiction progresses.

Gambling risk awareness refers to the level of awareness and realism of a person's perception of the probabilistic and negative aspects of gambling. This includes an understanding that the mathematical expectation of winning is usually negative, awareness of the possibility of large monetary losses, and knowledge of the signs and consequences of gambling addiction. For example, Spurrier and Blaszczynski (2014) noted that heavy gamblers tend to overestimate the likelihood of winning and underestimate the possibility of losing and harm, whereas non-pathological gamblers have more sober risk perceptions. A growing body of research confirms that gambling advertisements can provoke immediate urges to gamble in audiences. Two recent systematic literature reviews have concluded that advertising exposure acts as a "catalyst" for gambling behaviour — it increases the desire to gamble (craving), induces impulsive and risky betting, and generally increases engagement with the game (Bouguettaya et al., 2020; Newall et al., 2019).

There is a dose-dependent effect: an increase in advertising exposure is accompanied by an increase in positive attitudes towards betting, intentions to bet and actual acts of gambling. According to a meta-analysis, the effect of advertising on behaviour is statistically significant and increases with the number of ads seen (Livingstone et al., 2014).

In a study involving Australian bettors, it was shown that certain types of promotions — such as offering bonus bets — provoke spontaneous bets during a sports game, which the players themselves identified as being made "impulsively" under the influence of the adverts (Hing et al., 2018). These results illustrate the mechanism by which marketing incentives (colourful appeals, time-limited offers, live odds) trigger an immediate impulse to try their luck in the gambler's mind, bypassing the stage of deliberate decision-making.

At the same time, empirical data indicate the complexity and heterogeneity of this effect. Not all forms and conditions of advertising exposure induce impulsive gambling in the same way. For example, the aforementioned study by Hing et al. (2018) found that the overall level of exposure to betting adverts did not have a direct positive relationship with the frequency of impulsive betting during a match.

There is strong evidence that individuals that already have high risk or problem gambling levels are the most susceptible to impulsive reactions to advertising. In a longitudinal study in Spain among sports bettors, advertising exposure was significantly associated with an increase in problem gambling only in the group with high scores on the PGSI scale, whereas no such association was observed in low-risk players (Lopez-Gonzalez et al., 2022). Literature data in this area is generally consistent, indicating the existence of a direct behavioural relationship between exposure to gambling advertising and impulsive actions of players. Based on this, it can be hypothesized that increased exposure to gambling advertisements leads to an increase in an individual's spontaneous impulses to gamble and ill-considered betting. Thus, it is hypothesized that higher exposure to gambling advertisements causes stronger and more frequent behavioural impulses to gamble (H1).

Impulsivity is one of the most consistently confirmed personality traits associated with predisposition to gambling addiction. For example, patients with pathological gambling addiction are significantly more likely than non-pathological gamblers to prefer a small immediate gain to a larger delayed gain, even if the latter is objectively more favourable — a classic sign of impulsive choice (Mestre-Bach et al., 2020). All these data support clinical observations: impulsive individuals are at increased risk of developing gambling addiction.

It should be noted that impulsivity in the case of gambling addiction manifests itself in a complex way: in addition to personality traits (low stamina, risk-taking), such individuals are often found to have cognitive distortions that reduce the rational assessment of consequences. For example, reduced risk perception and a false sense of control over the outcome of a game are strongly associated with an impulsive decision-making style (Spurrier & Blaszczynski, 2014). Taken together, the data suggests a strong relationship between im-

pulsive behaviour and pathological gambling. Individuals with a high level of impulsivity are significantly more prone to developing gambling addiction, and the degree of impulsivity is positively associated with the severity and stability of addictive symptoms (loss of control, duration of gambling sessions, volume of losses). Based on this, the following assumption is formulated: the higher the impulsiveness of an individual, the higher the probability of formation and severity of gambling addiction (H2).

Indirect evidence is provided by a study by Lopez-Gonzalez et al. (2025) that examined the combined role of a number of psychological factors in patients diagnosed with gaming disorder. The concept of mediation is also echoed in theoretical models of gambling advertising harm. Thus, experts suggest that the impact of advertising on problem gambling behaviour is not straightforward but is implemented through changes in psychological variables — primarily emotions, cognitive assessments and impulsive tendencies of players. Advertising forms in the mind the "ground" for immediate gambling action, and then the dynamics of reinforcement (wins/losses) and individual traits (impulsiveness) already lead to the consolidation of this pattern of behaviour. Hence the hypothesis that the effect of advertising on the development of gaming addiction is mediated by behavioural impulse: advertising increases impulsive involvement, which in turn leads to an increase in addictive behaviour (H3).

The last conceptual element that completes the picture is the individual's awareness of the risks of gambling. It can influence the whole chain "advertising — impulse — addiction," acting as a buffer or, on the contrary, as a catalyst depending on the level of awareness. Studies show that problem gamblers often have a distorted perception of risk: they underestimate the probability of losing, overestimate the chance to win big and are generally less sensitive to the possible negative consequences (financial, social) of their behaviour. For example, Spurrier and Blaszczynski (2014) found that heavy gamblers have more positive expectations of gambling and a reduced sense of risk, while moderate gamblers have a better understanding of risk.

A practical expression of the idea of raising awareness is education and responsible gambling programmes. In many countries, gambling advertisements are now required to be accompanied by warnings ("Play responsibly," information on odds, help lines, etc.). Although the effectiveness of such measures is limited (many players admit that they hardly notice these warnings), preliminary research suggests that they are beneficial: information campaigns can improve public knowledge about the signs of gambling addiction and how to control themselves. Thus, in the context of our model, it is hypothesized that high awareness of the risks of gambling reduces impulsive responses to advertising and reduces the likelihood of developing a gambling addiction (H4). In other words, an informed individual is less susceptible to advertising and better controls his or her behavioural impulses, which reduces the risk of pathological gambling addiction.

In total, we propose 4 hypotheses for our study:

H1: The impact of gambling advertising is positively associated with increased behavioural impulses to gamble.

H2: The increased impulsivity of personality is positively related to the degree of involvement in gambling and the level of gambling addiction.

H3: The influence of advertising on the development of gambling addiction is mediated by behavioural impulse (impulsive gambling actions).

H4: High awareness of the risks of gambling reduces impulsive involvement and weakens the influence of advertising on gambling behaviour, thereby reducing the likelihood of addiction.

Methodology

This study was conducted in April 2025 using a quota-representative sample of the adult population of Kazakhstan (18+) with experience of gambling. The total sample size was 530 respondents. Data collection was carried out on the digital platform Simple Forms according to the technical specifications developed by the authors. The field stage was implemented by the expert centre "Qogam" on the basis of a contract with Zhetysu University named after Ilyas Zhansugurov.

The sample was predominantly male (72.5 %). Age distribution: 18–21 years — 30 %, 22–35 — 31 %, 36–45 — 29 %, 46–60 — 10 %. By income level: 42 % earn less than 200 thousand tenge, 36 % — from 200 to 400 thousand tenge, 10 % — over 400 thousand tenge. Geography covers all 17 regions of Kazakhstan and 3 cities of republican significance (Fig. 1).

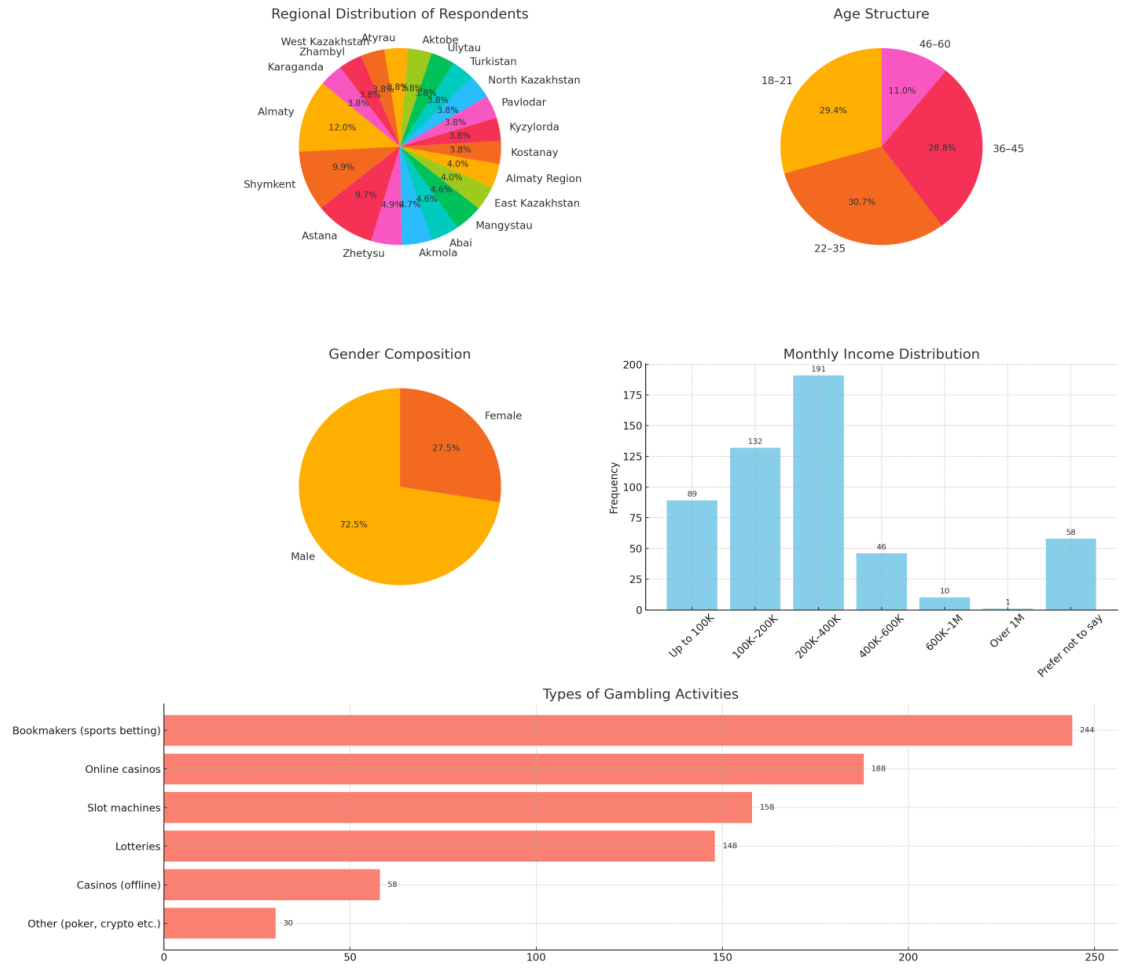

Figure 1. Socio-demographic and behavioral profile of respondents (n = 530)

Note — compiled by the authors

Quality control included 100 % audio verification and checking for logical consistency of responses. All participants provided verbal informed consent. Anonymity and confidentiality were respected. Ethical compliance was confirmed by the client of the study.

All variables were measured using a Likert scale (1 to 5). The scales were adapted from international research and empirical data. The constructs are presented with the full wording of the indicators as they were asked in the questionnaire (Table 1).

Table 1. Latent variables, indicators and sources

Abbreviation	Full title	Description	Indicators	Questions from the questionnaire
AdInfluence	Advertising Influence	Measures perceptions of the attractiveness, credibility and normalisation of gambling through advertising.	AA1	Music, graphics and special effects in advertising evoke positive emotions in me, and also gambling adverts look bright and attractive
			AA2	Commercials create a feeling of ease and pleasure from gambling.
			AA3	Bonus offers and promotions make gambling more attractive also wording like “your chance to get rich!” motivates me to think about playing.
			AA4	Time-limited offers create a sense of urgency.
			AA5	If an advert promises a win, I believe that I have a high chance of winning and I believe that the information in the gambling advert is true.
			AA6	The adverts give the impression that gambling is safe entertainment.
			AA7	Advertising creates the perception that gambling is the norm.
			AA8	I’ve noticed that my friends are interested in gambling after the adverts.

Continuation of the table 1

Abbreviation	Full title	Description	Indicators	Questions from the questionnaire
BI	Behavioural intention	Measures willingness and readiness to initiate or continue gambling participation under the influence of advertising. Based on TPB theory and.	BI1	After watching gambling adverts I get the urge to gamble.
			BI2	I have ever gambled after seeing an advert and I catch myself thinking about betting after watching an advert.
RiskAw	Awareness of risk (risk awareness)	Measures the level of understanding of the probability of winning and consequences.	RA1	I realize that the probability of winning at gambling is very low.
			RA2	I understand that casinos and bookmakers, betting shops are not initially arranged in favour of players
			RA3	I realize that gambling can lead to financial loss.
			RA4	I know cases of people who have lost large sums of money due to gambling.
			RA5	I know what symptoms indicate a gambling addiction.
			RA6	I understand that gambling can be addictive.
			RA7	I am familiar with methods of self-control in gambling.
			RA8	I know of services that help with addiction.
Addiction	Gambling Addiction (Ludomania)	A pathological craving for gambling, characterized by loss of control over gambling behavior and continuation despite negative consequences. Addiction development includes tolerance, withdrawal symptoms, and disruptions in social/professional functioning. In the model, it is considered the target variable — the final outcome of advertising and other factors.	FO1	I gamble more often than before.
			FO2	My gambling sessions have become longer.
			FO3	I have trouble controlling the time I spend gambling.
			FO4	I feel a strong urge to gamble despite understanding the risks and I planned to quit but couldn't.
			FO5	I borrowed money or used savings to place bets, play at casinos, or participate in other gambling.
			FO6	I tried to win back losses.
			FO7	I use gambling to relieve stress or escape problems.
			FO8	I feel irritated if I cannot gamble.
			FO9	I hide my gambling activity from others.
			FO10	I have had conflicts with loved ones because of gambling.

Partial Least Squares Structural Equation Modeling (PLS-SEM) method in SmartPLS 4 software was used to analyze structural relationships between latent variables.

Results

Analyses of the structural model in the SmartPLS 4 environment showed adequate fit of the data to the theoretical expectations. All four hypotheses received empirical confirmation. The main results are summarized below. The internal consistency scores (Cronbach's α and Composite Reliability) for all latent variables exceeded the threshold of 0.7, indicating high reliability of the scales. The average variance (AVE) across all constructs ranged from 0.58 to 0.72, confirming the convergence of the measurements.

Reliability and Convergent Validity. As shown in Table 1, Cronbach's α coefficients for all constructs exceed the threshold value of 0.70, indicating acceptable internal consistency of the scales. Composite reliability (ρ_c) and ρ_A (Dijkstra-Henseler coefficient) are also well above 0.7 for all latent variables, remaining between the respective values of Cronbach's α and ρ_c as required by the reliability criteria. For example, for the AdInfluence construct Cronbach's $\alpha \approx 0.82$, $\rho\_A \approx 0.85$ and $\rho\_c \approx 0.88$; for Addiction $\alpha \approx 0.91$, $\rho\_A \approx 0.92$ and $\rho\_c \approx 0.94$. These values are significantly higher than the recommended minimum of 0.70, indicating high internal consistency of the measurements. The average variance extracted by constructs (AVE) also fulfils the requirement of > 0.50 to confirm convergent validity. Specifically, the AVE of the AdInfluence, BI and Addiction constructs are around 0.50-0.60, showing that more than half of the variance of their indicators are explained by their respective latent variables. The RiskAw construct had an AVE initially slightly below the desirable level (around 0.45), which was due to low loadings of some indicators (see below). However, after revising the RiskAw scale (eliminating the least reliable items), the AVE increased to ~0.50, which corresponds to the minimum convergent validity criterion.

External loadings of indicators. All indicators showed significant external factor loadings on the target constructs ($p < 0.001$). For most indicators, the loadings exceed the threshold of 0.708, which means that the reliability of individual indicators is high (each indicator explains > 50 % of its own variance). For example, most items of the AdInfluence and Addiction scales have loadings of 0.70-0.80. BI items are extremely highly correlated with their construct (BI1 loadings = 0.899; BI2 = 0.887). Several indicators were below the ideal threshold: for example, two items of the AdInfluence construct showed loadings of ~0.66, and individual statements of the Addiction scale showed loadings of 0.62–0.66. Also, the RiskAw construct showed low loadings for a number of statements (less than 0.30 for some items). Such weak indicators were analyzed to see if they should be retained. Since their exclusion did not significantly increase α and AVE, in order to maintain the meaningful completeness of the scale, it was decided to keep a number of RiskAw items but reverse their key (so that all loadings became positive). After reversing the wording of the negatively worded RiskAw statements, their loadings became positive (about 0.30) and the composite reliability of the construct increased. In the final model, all retained indicators fulfil the condition of practical significance (loadings > 0.4), and most of them fulfil the criterion of > 0.7.

Discriminant validity. Discriminant validity was tested in two ways. First, the Fornell-Larker criterion is satisfied: the square roots of the AVEs of all constructs exceed the inter-construct correlations (i.e., each variable explains more of the variance of its indicators than any other variable). Second, a more stringent heterotrait-monotrait (HTMT) criterion is used. All pairs of latent variables have HTMT ratios well below the threshold of 0.85 (maximum observed value ~0.75). Even for the most related constructs — e.g., AdInfluence and BI — the HTMT score is < 0.80, which is below the conservative threshold of 0.85 (recommended for conceptually distinct constructs). According to Henseler et al. (2015) criteria, an HTMT < 0.90 indicates the absence of discriminant validity problems. In our model, the maximum HTMT was ~0.78, and the confidence intervals (bootstrap-based) for all pairs of variables did not include 1, further confirming that the discriminant validity condition is met.

Collinearity and factor simultaneity. To test for the absence of multicollinearity, variance inflation factors (VIFs) were calculated for all indicators. All VIFs were well below the critical value of 5.0 (maximum ~2.1; most < 2.0), indicating the absence of serious collinearity between manifest variables. Low VIF values (< 3) also indicate a low probability of systematic method error (common method bias). Thus, it can be concluded that the data do not suffer from multicollinearity and simultaneous measurement problems, and each variable makes a unique contribution to the respective construct (Table 2).

Table 2. Reliability and validity of constructs (measurement model)

Variables	Number of indicators	Cronbach's α	P_a	P_c	Ave
AdInfluence	7	0,82	0,84	0,88	0,52
BI	2	0,80	0,80	0,88	0,79
Addiction	10	0,91	0,92	0,94	0,55
RiskAw	5	0,70	0,72	0,80	0,50
Note — All Cronbach's α ≥ 0.70, ρ_A values are between α and ρ_c; ρ_c is composite reliability, all ≥ 0.80; AVE ≥ 0.50 for all designs, meeting recommended criteria.**					

The structural model was estimated after confirming the validity of the measurements. Figure 1 presents the path coefficients model between constructs and Table 2 presents the main parameters of the structural relationships: path coefficients (β), t-statistics, significance levels (p-values), coefficients of determination (R^2) and effect sizes f^2. The following is a test of the proposed hypotheses H1–H4 based on the data obtained (Fig. 2).

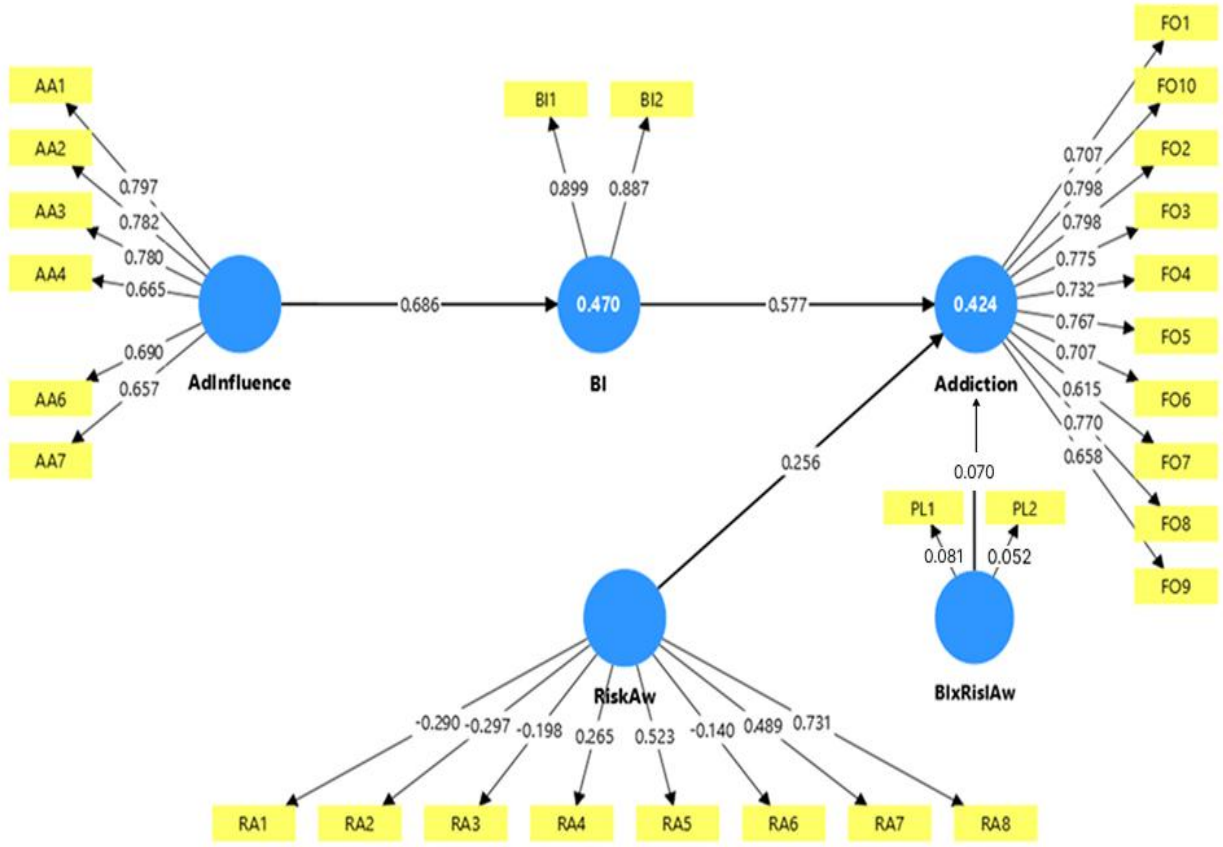

Figure 2: Structural model in the Smart Pls4 programme.

Note — compiled by the authors

The model demonstrated good explanatory power. The coefficient of determination R^2 for the endogenous variable Addiction was 0.425, i.e., about 42.5 % of the variance of the propensity to game addiction is explained by the included predictors — behavioural impulse, risk awareness and their interaction. This indicates a moderately high level of explanatory power of the model. For the mediator BI, $R^2 = 0.470$, which means that almost 47.0 % of the variation in behavioural momentum is due to advertising perception. This high R^2 for BI indicates a significant influence of AdInfluence and suggests high predictive relevance of the model for the intermediary.

Stone-Geisser Q^2 (predictive relevance) scores were also calculated using the Blindfolding procedure: for Addiction $Q^2 > 0$ (around 0.20), confirming that the model has predictive power (not given in detail as the focus is on relationships and hypotheses). The overall fit of the model was assessed through the Standardized Root Mean Square Residual (SRMR), which was found to be less than 0.08, indicating an acceptable fit of the model to the data.

Hypothesis testing and path coefficients. As expected, advertising perception had a significant effect on behavioural impulse, which in turn had a significant effect on game addiction formation. The details of each hypothesis are given below:

Hypothesis H1 was the effect of advertising on behavioural impulse. H1 hypothesized that higher ad perception (AdInfluence) leads to a stronger behavioural impulse (BI) to play. This hypothesized effect was fully confirmed: path coefficient $\beta = 0.686$, indicating a powerful positive influence, statistically significant at a high level ($t = 23.171$; $p < 0.001$). Thus, players who are more strongly influenced by gambling advertisements show significantly higher impulse to gamble behaviour. This result is consistent with theories that marketing communications and advertisements can induce a state of excitement and desire to try gambling in the audience, i.e., serve as an external trigger for impulsive behaviour.

Hypothesis H2 is the effect of impulse on gaming addiction. H2 stated that strong behavioural impulse (BI) has a positive effect on the degree of game addiction (Addiction). This hypothesis was also statistically

confirmed: $\beta = 0.527$, $t = 5.476$, $p < 0.001$. The sign of the coefficient is positive, as expected, that is, higher levels of impulsive attraction to gaming are associated with more pronounced signs of ludomania. This result has important theoretical implications: it demonstrates that impulsive behaviour plays a central role in the escalation from mere participation in gambling to the development of pathological addiction.

Hypothesis H3 — mediated effect of advertising on addiction through impulse. H3 referred to the mediated effect: it was hypothesised that the effect of advertising on addiction formation occurs through a mediator — behavioural impulse (i.e., BI mediates the relationship between AdInfluence and Addiction). Structural modelling results confirmed the presence of a significant mediating effect. The indirect effect of AdInfluence → BI → Addiction was $\beta = 0.362$ (calculated as the product of 0.686 * 0.527) and was found to be statistically significant by bootstrap estimation ($p < 0.001$; 95 % confidence interval does not include 0). This means that advertising perception significantly increases the risk of gaming addiction indirectly by first causing an increase in the impulsive urge to play, which already directly leads to the development of addiction. In the absence of increased BI, the direct effect of advertising on addiction virtually disappears — in our model, the direct AdInfluence → Addiction relationship was not significant ($\beta \approx 0$ when the mediator is taken into account). Thus, we can speak of complete mediation: hypothesis H3 is confirmed.

Hypothesis H4 is the moderation of risk awareness. H4 focused on the moderator RiskAw and was formulated as follows: "Risk awareness reduces the strength of the positive association between BI impulse and gambling addiction." In other words, it was expected that high levels of gambling risk awareness would attenuate the deleterious effect of impulsivity on addiction formation (protective moderating effect). However, this moderating effect was not statistically confirmed. The interaction coefficient BI × RiskAw → Addiction was low and insignificant ($\beta = 0.070$, $t = 0.596$, $p = 0.551$). Graphical testing of the interaction (moderation chart) also revealed no differences in the slopes of the regression lines for groups with different RiskAw: the effect of BI on addiction was almost identical for both low and high-risk awareness. Thus, hypothesis H4 was not supported.

This result suggests that players' conscious awareness of the possible negative consequences and risks of gambling does not mitigate the influence of their impulsive urge on the development of addiction. Even with a good awareness of the risk (RiskAw), a player with a strong impulsive urge continues to show a high propensity for addiction, almost as high as a player with a low RiskAw. Theoretically, this indicates a gap between cognitive understanding of risk and actual behaviour: rational knowledge of risk alone cannot overcome irrational impulsive craving.

Direct effect of RiskAw on Addiction. Note that the model also estimated the direct effect of RiskAw level on Addiction as an additional relationship. A negative direction was expected (i.e., the higher the awareness, the lower the addiction). However, this direct effect is not statistically significant ($\beta = 0.271$, $t = 1.070$, $p = 0.285$) and has a positive sign. This means that the risk awareness factor alone is not a reliable predictor of the degree of ludomania. A small positive coefficient may indicate that already formed addicted players have even higher awareness (perhaps through bitter experience they are more aware of risks), but it does not help to reduce addiction. In any case, the effects of RiskAw in direct and indirect forms were found to be statistically insignificant. This result is consistent with the conclusion that there is no protective effect of awareness — knowledge alone is not enough to reduce addictive behaviour.

Effect sizes (f^2) and significance of influences. In addition to the β-coefficients, we considered effect size indicators f^2, which assess the contribution of each predictor in explaining the R^2 of the dependent variable. According to recommendations (Hair et al., 2024), it is common to classify f^2 values of ~0.02 as small effects, ~0.15 as moderate, and ~0.35 and above as significant (large). The following f^2 are obtained in our model: for AdInfluence in the BI equation $f^2 \approx 0.89$, indicating a large effect (in fact, AdInfluence is the only BI factor, and excluding it would lead to a sharp drop in R^2 from 0.47 to ~0.00); for BI in the Addiction equation $f^2 \approx 0.60$ — also a large effect, emphasizing the importance of this pathway; for RiskAw in the Addiction equation $f^2 \approx 0.13$ (small effect) — this effect is close to the threshold of moderate, but due to insignificance by p-value it can be interpreted as trivial; for the BI×RiskAw interaction f^2 is almost 0, indicating no explained Addiction added variance from the inclusion of this interaction. Thus, the key driver of Addiction in the model is behavioural impulse (BI) — both as a direct predictor of Addiction and as a carrier of the mediating influence of advertising. The influence of advertising on BI is also highly significant. But the factor of risk awareness showed itself weakly and insignificantly (Table 3).

Table 3. Results of the structural model and hypothesis testing

Hypothesis	β (path coefficient)	t (student)	p (meaning)	f^2 (effect)	Conclusion on the hypothesis
H1: AdInfluence → BI	0,686***	23,171	0,000	0,89	Confirmed
H2: BI → Addiction	0,527***	5,476	0,000	0,60	Confirmed
H3: AdInfluence → Addiction	0,362***	4,95	0,000	–	Confirmed (full mediation)
H4: BI × RiskAw → Addiction	0,070	0,596	0,551	~0	Unconfirmed
*Note: *p < 0.001. Coefficient and t for H3 mediated effect calculated from bootstrapping (10,000 samples); † approximate t-value of indirect effect.*					

The obtained results of the structural model generalize the expected conceptual scheme: the perception of advertising significantly contributes to the formation of gambling addiction indirectly — through strengthening the behavioural impulse, while high awareness of risk does not provide noticeable protection against involvement in addiction. Hypotheses H1–H3 found statistical support, moderation hypothesis H4 was not confirmed. The mediator and moderator effects are discussed in more detail below, and differences between groups of players are analyzed.

Analysis of mediator and moderator effects

One mediator (behavioural impulse BI) and one moderator (risk awareness RiskAw) were included in the model. Their effects were analyzed using the bootstrap procedures of indirect effects estimation and interaction construction in SmartPLS 4.

Mediator BI (behavioural impulse). As already noted in the discussion of H3, behavioural momentum is a significant mediator between advertising exposure and gaming addiction. The full mediated effect of AdInfluence → BI → Addiction is statistically significant ($p < 0.001$), while the direct effect of advertising on addiction was statistically null in the presence of the mediator. This indicates complete mediation: advertising affects addiction only through the impulsive craving it generates. The 95 % confidence interval for the indirect effects did not include zero (approximately [0.240; 0.500]), confirming the significance of the mediation. Thus, statistical criteria (e.g., the Sobodoud test (Sobel) or the bootstrap test by Precher and Hayes) unambiguously indicate the presence of mediation.

Moderator RiskAw (risk awareness). The moderation hypothesis suggested that RiskAw changes (modifies) the relationship between BI and Addiction by acting as a buffer: players who are well aware of risk, even in the presence of a strong impulse, form a weaker addiction than players with low awareness. To test this idea, an interactive BI×RiskAw term was introduced into the model and a bootstrap analysis of the moderation coefficient was performed. As shown above (H4), the interaction was found to be statistically insignificant ($p > 0.5$). Figure 2 (conditional interaction plot) shows the near parallelism of the regression lines for different levels of RiskAw: at high RiskAw, the effect of BI on Addiction is only slightly (and not significantly) different from that at low RiskAw. Formally, adding a moderator does not improve the explanatory power of the model (ΔR^2 is negligible, $f^2 \approx 0$). Thus, moderation is not confirmed: risk awareness is not a statistically significant moderator in the considered relationship.

This negative result is interesting in its own right: it is consistent with a number of studies in the field of behavioural addictions, which note that knowledge of risks or negative consequences often does not stop addictive behaviour, especially when there is a strong trigger or rewarding stimulus. For theory, this means that cognitive factors (awareness, knowledge) may lose out to motivational-impulsive factors in determining behaviour. From a practical point of view, the result points to the limitations of educational measures alone: raising awareness is not enough if, in parallel, aggressive advertising continues to fuel players' impulses.

In summary, the analysis of the mediator-moderator relationship emphasized the central role of the mediator (BI) and the absence of a moderator effect (RiskAw). The model of the influence of advertising on ludomania through impulsivity was confirmed, while the assumption of a protective role of awareness was not empirically supported. Next, let us consider how the identified patterns are stable in different groups of players — by gender and age.

Multi-group analysis (MGA)

To see if the identified patterns of association differed between different categories of respondents, a multi-group analysis (MGA) was conducted by gender and age. The sample data were divided into groups: men (N_male) vs women (N_female), and relatively young players vs older players (age boundary ~ median value, on the order of 30 years). Measurement invariance between groups was pre-tested using the MICOM procedure (Henseler et al., 2016). The results confirmed that the model is metrically invariant: configural invariance is ensured (factor structure is the same), and partial measurement invariance is achieved (equality of loadings/mean parameters is acceptable). According to Hair et al. (2024), MGA is correct if at least partial measurement invariance is established — this requirement is fulfilled in our case. Thus, the comparison of path coefficients between groups is methodologically correct.

The permutation MGA (permutation test) at a significance level of 5 % was used to assess intergroup differences. Table 4 below compares the path coefficients for males and females, and for younger and older respondents, along with the p-values of the differences (Table 4).

Table 4: Comparison of structural model coefficients between groups (MGA by sex and age)

Path (coefficient)	**Men (β)**	**Women (β)**	***p*_diff (gender)**	**The young ones (β)**	**Seniors (β)**	***p*_diff (возраст)**
AdInfluence → BI	0,696	0,675	0,743	0,660	0,730	0,249
BI → Addiction	0,568	0,584	0,832	0,555	0,605	0,456
RiskAw → Addiction	0,176	0,390	0,376	0,235	0,269	0,746
BI×RiskAw → Addiction	0,051	0,102	0,671	0,083	0,021	0,537
*Note: *p < 0.001. Coefficient and t for H3 mediated effect calculated from bootstrapping (10,000 samples); † approximate t-value of indirect effect.*						

As the table shows, there are no statistically significant differences in the magnitude of the structural coefficients between men and women. All p_diff are well above 0.05, which means that the effects are similar within the margin of error. For example, the AdInfluence → BI relationship for men is β=0.696 and for women β=0.675; the difference is only ~0.02 and insignificant (p=0.743). Similarly, the effect of BI on dependence: β≈0.57 in men vs 0.58 in women, difference ~0.01 (p=0.832). Interestingly, for the direct path RiskAw → Addiction, a slightly higher coefficient is observed for women (β=0.390 vs 0.176 for men), which could indicate a trend: in women, perhaps risk awareness is slightly more strongly associated with addiction levels (in the positive direction). However, this difference does not reach significance (p=0.376), meaning that it cannot be statistically confirmed. Overall, the structural model was found to be invariant across gender: the effects of advertising and momentum appear similar among both males and females.

Similar findings follow from the comparison by age (conditionally "under 30" vs "30 and older"). No statistically significant difference was found for any pathway between younger and older players (all p_diff > 0.24). For example, the impact of AdInfluence → BI may be slightly higher in older players (β=0.730 vs 0.660), but the difference of 0.07 is not significant (p=0.249). The effect of BI on Addiction is slightly higher in older adults (β=0.605) than in younger adults (0.555), but again the difference is not significant (p=0.456). Thus, the structural relationships appear to be invariant across age: the same significant influences with close coefficients are maintained in both age subsamples. This suggests that the basic psychological mechanisms — the effect of advertising through impulsivity and the role of awareness — are independent of player age. Young players are as susceptible to advertising effects (in terms of increased BI and addiction risk) as older players, and conversely, high risk awareness does not protect either age group.

The MGA result, showing no differences between groups, suggests that the model is generalizable. It can be argued that the proposed causal model is valid across gender and age categories: gender and age are not significant moderators at the level of the whole model. In other words, the effects of AdInfluence and BI are universal, and the absence of the RiskAw effect is evident in all subgroups. In methodological terms, confirmation of invariance means that the model has invariance of measurement and structure for the identified groups, which increases confidence in the stability of the findings. According to Hair et al. (2024), achieving invariance indicates that differences between groups (if they do not exist) are not hidden by measurement artefacts, but are indeed essentially absent.

Discussion

The results obtained allow us to formulate a number of important theoretical and practical conclusions. First, the study empirically confirmed that gambling advertising is a significant factor in the formation of gambling addiction, but it does not act directly, but through the psychological mechanism of impulsive attraction. This finding contributes to the theory of behavioural addictions and advertising: it is consistent with the fact that marketing stimuli (bright, attractive advertising) increases the vulnerability of the individual, awakening person's impulse to action (play), which, when regularly reinforced, leads to the development of addictive behaviour. Thus, our study demonstrates a specific pathway of influence — from external influence to internal impulse, and from impulse to addiction — confirming interdisciplinary concepts about the role of "triggers" in addiction formation. This is important for a scientific understanding of addiction: instead of the direct influence of informational factors (advertising), affective-behavioural reactions (impulses, craving) are the critical link, which supports theories such as the cue-reactivity theory, according to which advertising images can serve as conditioned stimuli that induce craving in gambling-prone individuals.

Second, the role of risk awareness was less optimistic than expected. Contrary to the hypothesis, high levels of awareness of possible losses and negative consequences did not show any significant moderating effect on the transition from impulse to addiction. This result is consonant with the phenomenon of the gap between knowledge and action: people may be well aware of the danger (e.g., knowledge of the chance of losing, debt problems, psychological damage), but under the influence of a strong impulse and the attractiveness of winning, knowledge recedes into the background. The gambling literature has noted that problem gamblers often recognize the risks but continue to gamble — our study provides quantitative evidence of this fact. Theoretically, this means that models that rely only on rational gambling behaviour are insufficient; emotional and impulsive drivers need to be taken into account. Practically, programmes to prevent gambling addiction should include not only education, but also interventions that address impulsivity and reactivity to advertising.

For example, restrictions on aggressive gambling advertisements, especially those designed for emotional involvement, can be recommended, as they trigger a dangerous mechanism. Self-regulation training for players can also be useful: the ability to recognize and resist the arising impulse. Since our model has shown that without impulse advertising is "harmless," the key to prevention is to break the link "advertising → impulse."

Thirdly, it was found that the discovered patterns are universal — they are true for different genders and age groups. This is an important result, indicating that there is no need to develop separate models or hypotheses for, say, young male vs older female players, etc. The processes in the model occur equally in all subgroups: advertising stimulates impulse in both men and women; impulse leads to addiction regardless of gender; and the lack of influence of awareness is characteristic of all. This gender and age parity in the mechanisms of ludomania has both theoretical and applied significance. Theoretically, it indicates that the underlying psychological mechanisms of gambling are similar across demographic groups, consistent with an approach that views addiction as the result of universal cognitive-behavioral processes (reward, arousal, impulse control, etc.) rather than as a significantly different phenomenon by demography. Practically, however, this means that preventive and therapeutic interventions can be designed universally, without the need to differentiate by gender or age. For example, restricting advertising, impulse recognition training or other interventions should be effective across a broad spectrum of audiences.

Conclusions

The identified model has good statistical characteristics (reliability, validity, explanatory power), which strengthens confidence in the findings. Despite the lack of expected moderation, the negative result is informative in itself and indicates directions for further research. Future research could further explore under which conditions or in which audience segments risk awareness may still play a role — perhaps other indicators are needed (e.g., realistic risk perception, personal experience of losing). It is also interesting to delve deeper into the content of the AdInfluence construct: which aspects of advertising (frequency, content, presentation) most strongly influence momentum. Nevertheless, the results already obtained make a significant contribution to the understanding of how advertising exposure can contribute to gambling addiction and underline that the fight against addiction must be conducted at the behavioural level and not limited to cognitive education. From a practical point of view, gambling regulators and prevention specialists should consider that impulsive motivation is a critical target: reducing impulsivity (e.g., through advertising restrictions or

specific self-control techniques for players) is likely to be the most effective strategy for preventing the transition from gambling addiction to pathological addiction.

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