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Chasing the Present: Cognitive Distortions, Time Perspective, and Alcohol use in Adolescent Gambling

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Abstract
Adolescence represents a critical developmental period for the emergence of maladaptive gambling behaviors, including loss chasing, a key marker of gambling-related harm. The present study provides the first behavioral examination of the interplay among gambling severity, gambling-related cognitive distortions, temporal perspective, alcohol use, and chasing behavior in a sample of Italian adolescents. Participants completed the South Oaks Gambling Screen for Adolescents (SOGS-RA), the Gambling Related Cognitions Scale (GRCS), the Consideration of Future Consequences Scale (CFC-14), and the Alcohol Use Disorders Identification Test (AUDIT), and performed a computerized task assessing chasing behavior. Participants were randomly assigned to either a control or a loss condition. Logistic regression analyses indicated that illusion of control and present-oriented time perspective predicted chasing initiation, independent of gambling severity. The loss condition did not significantly influence initiation but did predict chasing persistence. Hierarchical linear regression further showed that chasing persistence was predicted by the loss condition, higher illusion of control and predictive control, stronger present orientation, and greater alcohol use, over and above gambling severity. Path analysis identified cognitive distortions as the primary mechanism underlying chasing persistence, exerting both direct effects and indirect effects through increased temporal myopia. Notably, gambling severity did not independently predict chasing once cognitive and temporal factors were considered. These findings suggest that loss chasing in adolescence may reflect a distinct behavioral vulnerability driven by distorted beliefs and present-focused orientation rather than overall gambling severity. Targeting predictive control beliefs and strengthening future-oriented thinking may enhance prevention and early intervention strategies for youth gambling.

Keywords Adolescent gambling · Chasing behavior · Cognitive distortions · Temporal perspective · Alcohol use · Gambling severity

Chasing losses refers to a persistent gambling behavior in which individuals continue to gamble in an attempt to recover previous financial losses (Lesieur, 1979, 1984). Rather than

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discouraging continued play, losses often intensify gambling involvement, giving rise to a self-reinforcing cycle central to the development and maintenance of gambling disorder (Chen et al., 2025; Sharpe, 2002; Zhang & Clark, 2020). Breen and Zuckerman (1999) identified two forms of chasing: within-session chasing, defined as prolonged, excessive gambling within a particular session, and between-session chasing, which involves returning to gamble on another day to recoup losses. Although not all individuals who gamble chase losses, this behavior is a hallmark of compulsive gambling that persists despite harmful consequences (Lesieur, 1984).

Despite substantial advances in the study of chasing behavior (Banerjee et al., 2023), the literature remains predominantly focused on adult populations, with comparatively limited attention given to adolescents. This imbalance is concerning given adolescents' heightened vulnerability to gambling-related problems. Compared with adults, adolescents not only show substantial rates of gambling participation but also disproportionately elevated prevalence rates of problem gambling (Delfabbro & Thrupp, 2003; Shaffer & Hall, 2001).

Developmental considerations further suggest that mechanisms identified in adult samples may not fully generalize to adolescence. This period is characterized by ongoing maturation of neurocognitive systems underlying executive control, reward processing, and future-oriented decision-making (Casey et al., 2008; Steinberg, 2008). Adolescents typically display heightened reward sensitivity, increased impulsivity, and reduced capacity to evaluate long-term consequences. These characteristics may amplify present-oriented decision-making and increase susceptibility to maladaptive gambling behaviors such as chasing. Additionally, adolescents may be particularly prone to gambling-related cognitive distortions due to their still-developing probabilistic reasoning and greater reliance on heuristic processing (Cosenza et al., 2019; Delfabbro et al., 2006).

As a result, the interplay between cognitive distortions, temporal perspective, and chasing behavior may operate differently, or be more pronounced, than in adults, underscoring the need for developmentally informed research.

In Italy, a 2017 national survey of 15,602 adolescents aged 14 to 17 found that 29.2% had gambled in the past year, with 3.0% meeting criteria for severe problem gambling (Mastrobattista et al., 2021). Beyond cross-national variability (Testa et al., 2025), online gambling among 15- to 16-year-olds in Europe nearly doubled between 2019 and 2024, reaching 14% (European Monitoring Centre for Drugs and Drug Addiction, 2025). These epidemiological trends underscore the importance of identifying factors that initiate and sustain gambling behavior during adolescence, particularly given that early gambling onset is a robust predictor of persistent gambling disorder and long-term psychosocial difficulties extending into adulthood (Tran et al., 2024).

Research conducted with adult samples indicates that chasing behavior is closely associated with gambling-related cognitive distortions, defined as systematic biases that skew interpretations of gambling outcomes and promote irrational beliefs concerning skill, control, and chance (Hunt & Blaszczynski, 2019). In particular, interpretative bias, as assessed by the Gambling Related Cognitions Scale (Raylu & Oei, 2004), has been linked to chasing behavior as well as heightened neural activation in brain regions involved in reward processing (Campbell-Meiklejohn et al., 2008). More recent evidence suggests that specific gambling-related cognitive distortions robustly predict the decision to continue gambling following losses (Nigro et al., 2022). Importantly, two specific distortions appear particularly relevant to chasing: Illusion of Control, which is the mistaken belief that one can

actively influence outcomes objectively determined by chance (Langer, 1975, 1983), and Predictive Control, which is the conviction that gambling outcomes can be anticipated, that losses presage imminent wins, or that a single win signals continued success (Cosenza et al., 2023). Together, these distortions form a complementary cognitive architecture that may sustain chasing by reinforcing the conviction that persistence can alter fortune or reveal hidden order in stochastic events. Adolescents who endorse such distorted beliefs, including misconceptions about randomness and overestimation of winning probabilities, are at heightened risk for developing problem gambling (Cosenza et al., 2019; Delfabbro et al., 2006; Donati et al., 2018; Favieri et al., 2025).

Chasing behavior is also closely associated with individual differences in time perspective. A pronounced present orientation, defined as the tendency to focus on immediate gratification with reduced consideration of future consequences, reliably predicts both gambling persistence and loss chasing (Ciccarelli et al., 2019; Cosenza et al., 2020). Nigro and colleagues (2022) further showed that present-focused temporal perspective is implicated in both the initiation and the persistence of chasing. This present-focused bias amplifies a central paradox of gambling decision-making: wagering again to recover prior losses may appear immediately advantageous, yet it almost invariably results in further losses and escalating harm. Importantly, gambling-related cognitive distortions exert not only direct effects on chasing but also indirect effects mediated by a shortened temporal horizon (Nigro et al., 2022), underscoring the complex interplay between irrational beliefs and time perspective in sustaining maladaptive gambling behavior. Although alcohol use is known to substantially influence gambling behavior, its specific contribution to chasing has received comparatively little empirical attention, particularly among adolescents, a group in which alcohol consumption is widespread. Alcohol amplifies several proximal risk factors for chasing, including impulsivity, impaired decision-making, and heightened craving, thereby reinforcing maladaptive gambling trajectories (Ciccarelli et al., 2020; Goudriaan et al., 2005; Sharma & Weinstein, 2025; Slutske et al., 2005). Importantly, alcohol misuse predicts chasing persistence over and above overall gambling severity, suggesting a distinct and additive effect on loss continuation (Cosenza et al., 2025; Nigro et al., 2019). The robust comorbidity between gambling disorder and alcohol use disorder observed across age groups further reinforces the close interplay between these conditions (Barnes et al., 2009; East et al., 2025; Rahman et al., 2014).

While previous studies have examined chasing behavior in relation to cognitive distortions (Nigro et al., 2022), time perspective (Ciccarelli et al., 2019), or alcohol use (Cosenza et al., 2020) in isolation, no study to date has integrated all three mechanisms within a single design using a behavioral chasing task in adolescents. Moreover, prior research has typically focused either on chasing initiation or persistence, but not both. This fragmentation limits our understanding of whether these mechanisms operate similarly across the decision to start chasing versus the tendency to persist in chasing once initiated. Furthermore, although gambling severity consistently correlates with chasing at the bivariate level, it remains unclear whether severity exerts a direct effect on chasing or operates indirectly through more proximal psychological processes such as craving, delay discounting, and alcohol use. Previous multivariate regressions have shown that severity often fails to predict chasing once these processes are included (Cosenza et al., 2025), but no study has formally tested whether this pattern reflects statistical mediation, that is, whether severity affects chasing because it increases craving, steepens delay discounting, or promotes alcohol use.

To isolate the causal effect of monetary loss on chasing behavior, the present study employed an experimental between-subjects design. Previous correlational studies have shown that individuals who chase losses report greater subjective distress following losses, but cannot establish whether loss exposure causes increased chasing. By randomly assigning participants to either a loss condition, in which they experienced a net loss exceeding their starting budget, or a control condition, in which they retained their initial budget, the present study aimed to test whether loss exposure has a direct causal effect on both the decision to initiate chasing and the persistence of chasing once initiated. This design allows disentangling the effects of situational loss from stable individual differences in motivational and cognitive processes.

The present study addressed five research questions. First, does exposure to monetary loss compared to a control condition increase the likelihood of initiating chasing and the persistence of chasing once initiated? It was hypothesized that participants in the loss condition would show greater chasing initiation and persistence than those in the control condition (Cosenza et al. 2024; Nigro et al. 2018b, 2022). Second, do gambling-related cognitive distortions, particularly Illusion of Control and Predictive Control, predict chasing initiation and persistence? It was hypothesized that higher scores on Illusion of Control and Predictive Control would predict both greater likelihood of chasing initiation and greater chasing persistence (Campbell-Meikjohn et al., 2008; Nigro et al., 2022). Third, does present-oriented time perspective predict chasing initiation and persistence? It was hypothesized that higher present orientation would predict both greater likelihood of chasing initiation and greater chasing persistence, whereas future orientation would show negative associations (Ciccarelli et al., 2019; Cosenza et al., 2020; Nigro et al., 2022). Fourth, does alcohol use predict chasing initiation and persistence? It was hypothesized that higher alcohol use would predict greater chasing persistence, consistent with prior evidence (Cosenza et al., 2020, 2025; Nigro et al., 2019), but may not predict initiation, suggesting a specific role in maintaining rather than triggering chasing. Fifth, does gambling severity exert a direct effect on chasing, or is its effect mediated by craving, delay discounting, and alcohol use? It was hypothesized that the association between gambling severity and chasing persistence would be fully mediated by craving, particularly the Desire dimension, delay discounting, and alcohol use, such that the direct effect of severity becomes non-significant after accounting for these mediators.

The present study advances the literature in four key ways. It simultaneously examines motivational, cognitive, and disinhibitory processes within a single design, moving beyond isolated examinations of each mechanism. It treats chasing initiation and chasing persistence as related but potentially distinct outcomes, allowing identification of mechanisms that may operate differently at each stage. It uses a validated behavioral task rather than self-reported chasing, reducing recall bias and increasing ecological validity. Finally, it formally tests whether gambling severity operates indirectly through proximal psychological processes rather than directly affecting chasing, clarifying a pattern previously observed but not explained in multivariate regressions. By addressing these gaps, the present study aims to provide a more comprehensive, developmentally informed understanding of chasing behavior in adolescence, with implications for targeted prevention and intervention.

Materials and methods

Participants and procedure

A convenience sample of 216 adolescents (48.6% boys) aged 16–19 years (M = 17.33, SD = 0.95) was recruited from public high schools in Southern Italy. The study employed a between-subjects experimental design in which participants were randomly assigned to either a control or a loss condition within a computerized chasing task. Block randomization ensured balanced group sizes across conditions. The behavioral task was administered together with standardized self-report measures assessing gambling severity, temporal perspective, alcohol use, and gambling-related cognitive distortions. Data collection was conducted individually on school premises, and participants received no compensation.

To control for potential order effects, the administration order was counterbalanced: half of the participants completed the ChasIT task before the questionnaires, whereas the remaining half completed the questionnaires first. The order of the self-report instruments was likewise counterbalanced. Each experimental session lasted approximately 55 min.

The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the first author's institution. Participants were fully informed about the study aims, procedures, and their rights prior to participation. Written informed consent was obtained from all participants, and additional parental consent was secured for minors.

Measures

Gambling severity was assessed using the South Oaks Gambling Screen–Revised for Adolescents (SOGS-RA; Winters et al., 1993; Italian validation: Colasante et al., 2014). Total scores range from 0 to 12, with higher scores indicating greater gambling severity. In the present sample, reliability was satisfactory (α = 0.75).

Temporal perspective was measured with the Consideration of Future Consequences Scale (CFC-14; Joireman et al., 2012; Italian validation: Nigro et al., 2016), which comprises two subscales: the Immediate subscale (CFC-I), reflecting a present-oriented focus, and the Future subscale (CFC-F), reflecting consideration of distal consequences. Items are rated on a seven-point Likert scale. In the current study, reliability coefficients were 0.86 for the CFC-I and 0.78 for the CFC-F.

Alcohol use and related problems were evaluated using the Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993), a 10-item screening instrument assessing alcohol consumption patterns, dependence symptoms, and alcohol-related harm. Each item is scored from 0 to 4, with total scores ranging from 0 to 40. Higher scores indicate greater problematic alcohol use. The AUDIT has been validated for use with adolescent populations, with studies demonstrating good sensitivity and specificity for identifying hazardous drinking and alcohol use disorder in youth (Chung et al., 2018; Knight et al., 2003). In adolescent samples, a cutoff score of 3 or higher on the first three consumption items (AUDIT-C) has been recommended for identifying hazardous drinking, whereas a full AUDIT total score cutoff of 4 or higher has been proposed for identifying probable alcohol use disorder (Källmén et al., 2019; Kelly et al., 2019; Liskola et al., 2018). The AUDIT was treated as

a continuous measure in primary analyses to preserve variance in alcohol-related problems across the full range of scores, consistent with prior adolescent gambling research (Cosenza et al., 2020, 2025). Internal consistency in the present sample was good ($\alpha = 0.80$).

Gambling-related cognitive distortions were assessed using the GRCS (Raylu & Oei, 2004; Italian validation: Donati et al., 2015), a 23-item instrument that evaluates maladaptive gambling-related beliefs across five domains: Gambling Expectancies (GE), Illusion of Control (IC), Predictive Control (PC), Inability to Stop (IS), and Interpretative Bias (IB). Notably, the IB, PC, and IC subscales specifically capture core cognitive distortions, whereas GE reflects motivational aspects of gambling, and IS indexes metacognitive beliefs related to perceived loss of control over gambling behavior. Items are rated on a seven-point Likert scale. In the current study, the total scale demonstrated excellent reliability ($\alpha = 0.94$).

Chasing behavior was assessed using the computerized ChasIT task (Nigro et al., 2018a, b), which simulates a card-based gambling game. Participants began the task with an initial budget of €10 treated as real money. During each trial, both the participant and the virtual house drew a card numbered from 1 to 9. Participants won €1 when their card exceeded the house's card and lost €1 otherwise. After completing an initial block of 30 trials, participants were informed of their cumulative outcome and were asked to decide whether to continue playing or terminate the game.

Experimental manipulation differed across conditions. In the control condition, participants retained their full initial budget following the first phase. In the loss condition, participants experienced a cumulative loss of €12, exceeding the starting budget by €2. Although win and loss sequences were randomized, they were identical for all participants within each condition. During the second phase, participants assigned to the loss condition continued gambling on credit. Both conditions included a second phase consisting of 30 trials, although participants were not informed of the total number of trials in advance. Throughout the second phase, participants received continuous feedback regarding their remaining balance or credit and were repeatedly given the opportunity to decide whether to continue or discontinue play. Chasing behavior was operationalized dichotomously and continuously. Participants who chose to stop after the first phase were classified as non-chasers, whereas those who elected to continue were classified as chasers. The primary dependent variables were chasing initiation, defined as the decision to continue playing after the first phase, and chasing persistence, defined as the total number of trials completed during the second phase.

Statistical analyses

Data analyses were conducted using IBM SPSS version 30.0, with statistical significance set at $p < 0.05$. To ensure that the study was sufficiently powered, post hoc power analyses were planned. G*Power 3.1 (Faul et al., 2009) was used to estimate power for detecting path coefficients in regression models, and Monte Carlo simulations were employed to assess power for mediation effects (Schoemann et al., 2017). Prior to analysis, variables were screened for missing data, distributional abnormalities, and outliers following standard guidelines (Tabachnick & Fidell, 2019). Square-root transformations addressed skewness in SOGS-RA and GRCS Inability to Stop scores. Pearson correlations examined relationships among study variables, with Benjamini-Hochberg correction for multiple comparisons (Benjamini & Hochberg, 1995). Group differences were assessed using chi-square tests and univariate ANOVAs.

To ensure transparency regarding how each analysis addresses the specific research questions outlined in the introductive section, the analytic strategy is described below with explicit reference to each research question.

For Research Question 1, which asked whether exposure to monetary loss increases chasing behavior, a chi-square test was conducted to compare chasing initiation between the loss and control conditions, and a univariate ANOVA was conducted to compare chasing persistence between the two conditions. These analyses directly tested the hypothesis that participants in the loss condition would show greater chasing initiation and persistence than those in the control condition. The experimental between-subjects design was employed to isolate the causal effect of monetary loss, allowing us to disentangle the effects of situational loss from stable individual differences in motivational, cognitive, and disinhibitory processes. Even if the experimental manipulation does not significantly affect chasing initiation, this null finding remains informative as it would suggest that the decision to start chasing may be driven more by stable dispositional factors than by transient situational losses.

For Research Questions 2, 3, and 4, which asked whether gambling-related cognitive distortions, present-oriented time perspective, and alcohol use respectively predict chasing behavior, hierarchical regression analyses were conducted. Hierarchical logistic regression was conducted to predict chasing initiation, with group membership defined as nonchasers versus chasers as the criterion variable. In the first step, demographic variables of gender and age were entered as predictors. The second step added experimental condition, coded as control versus loss. The third step included gambling severity as measured by the SOGS-RA, temporal perspective as measured by the CFC-14 Immediate and Future subscales, alcohol use as measured by the AUDIT, and gambling-related cognitive distortions as measured by the GRCS subscales, with specific attention to the Illusion of Control and Predictive Control subscales which were hypothesized to be particularly relevant to chasing. Chasing persistence was analyzed via hierarchical linear regression with total ChasIT score as the dependent variable, using the same order of predictors. Variance inflation factors for all predictors were below 10, indicating no problematic multicollinearity (Ryan, 2008).

For Research Question 5, which asked whether cognitive distortions mediate the relationship between present orientation and chasing persistence or whether present orientation mediates the relationship between cognitive distortions and chasing persistence, two competing path analysis models were tested using Eq. 6.2 software (Bentler, 2008). Maximum likelihood estimation was employed, with the Satorra-Bentler scaled chi-square correction applied to account for non-normality by adjusting standard errors and fit indices for kurtosis (Satorra & Bentler, 1994). Model 1 hypothesized that present orientation predicts chasing both directly and indirectly via the GRCS Predictive Control and Illusion of Control subscales. Model 2 proposed the reverse, with cognitive distortions predicting chasing directly and indirectly through present orientation. For both models, cognitive distortions were operationalized as a composite score summing the Predictive Control and Illusion of Control subscales, consistent with prior research (Nigro et al., 2022). Model fit was evaluated using multiple indices including the Satorra-Bentler scaled chi-square with nonsignificant p-values indicating good fit, the standardized root-mean-square residual with values below 0.08 indicating acceptable fit, the root-mean-square error of approximation with values below 0.08 indicating acceptable fit along with its 90% confidence interval, the goodness-of-fit index with values above 0.95 indicating good fit, and the comparative fit index with values above 0.95 indicating good fit. Indirect effects were tested using the Monte Carlo

method for assessing mediation (Selig & Preacher, 2008), which generates confidence intervals based on simulated sampling distributions of the indirect effect. Confidence intervals were computed using 20,000 simulated samples. For the path analysis, cognitive distortions were operationalized as a composite score summing the Predictive Control and Illusion of Control subscales. A composite approach was retained for parsimony and consistency with prior research (Nigro et al., 2022), which conceptualizes these subscales as complementary components of a broader cognitive distortion construct that together form the cognitive architecture sustaining chasing behavior.

Observed power analyses indicated that the study had sufficient sensitivity to detect the hypothesized effects, with 0.92 power for direct path coefficients of $\beta \geq 0.13$ and 0.78 power for indirect mediation effects of $ab = 0.061$ (Schoemann et al., 2017). These results suggest that the sample size was adequate to reliably test both direct and indirect pathways in the mediation models.

Results

Descriptive statistics by experimental condition and gender are detailed in Table 1. Based on the SOGS scoring system (Winters et al., 1993, 1995), the sample included 75.5% non-problem gamblers, 14.8% individuals experiencing gambling problems, and 9.7% probable pathological gamblers. The most frequently reported gambling activities were lottery games reported by 53.2% of participants, card games reported by 51.4%, and sports betting reported by 49.1%, with participants able to select multiple options. The primary motivations for gambling were entertainment or fun reported by 54.2% and the pursuit of monetary gain reported by 27.3%, with multiple responses allowed.

Table 1 Means and standard deviations by experimental condition and gender

Condition	Control ($N=108$)				Loss ($N=108$)				Gender effects (univariate F)		
Gender	Males ($N=53$)		Females ($N=55$)		Males ($N=52$)		Females ($N=56$)				
	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*	$F_{1, 214}$	*p*	η^2_p
SOGS-RA[a1]	1.43	1.86	0.87	1.75	1.46	1.75	0.88	1.77	8.60	0.004	0.039
CFC-14[b]											
Immediate	20.00	6.53	18.22	7.00	20.92	6.70	19.55	7.48	0.75	n.s.	
Future	31.00	7.25	28.67	8.52	29.46	7.97	30.63	8.54	0.26	n.s.	
AUDIT[c]	3.89	4.35	2.62	4.50	4.42	4.67	2.77	4.03	3.89	0.015	0.027
GRCS[d]											
Gambling Expectancies	6.49	3.46	5.61	3.17	7.90	4.59	6.23	3.48	6.20	0.014	0.028
Illusion of Control	6.53	3.60	5.67	3.02	7.00	3.99	5.95	3.42	3.97	0.048	0.018
Predictive Control	13.51	6.01	11.56	6.11	14.33	6.36	11.88	6.19	6.87	0.009	0.031
Inability to Stop gambling[1]	7.98	3.83	6.51	2.87	8.42	4.65	7.82	5.71	4.58	0.034	0.021
Interpretative Bias	8.42	4.72	6.73	3.92	8.65	5.09	6.79	4.19	8.52	0.004	0.038
Chasing persistence	1.38	2.87	1.05	3.13	3.63	8.09	2.39	5.55	1.10	n.s.	

[a]South Oaks Gambling Screen - Revised for Adolescents; [l]Transformed scores; [b]Consideration of Future Consequences scale; [c]Alcohol Use Disorders Identification Test; [d]Gambling Related Cognitions Scale

[1] Untransformed scores

Addressing Research Question 1, which asked whether exposure to monetary loss increases chasing behavior, no significant baseline differences emerged between the Control and Loss conditions on demographic or psychological variables, with all p values greater than 0.05. A univariate ANOVA revealed significant gender differences as reported in Table 1: males showed higher scores on gambling severity as measured by the SOGS-RA, alcohol use as measured by the AUDIT, all dimensions of gambling-related cognitive distortions as measured by the GRCS, and chasing persistence.

Correlational analyses presented in Table 2 indicated that age was positively associated only with alcohol use as measured by the AUDIT. Chasing persistence exhibited moderate to strong positive correlations with gambling severity as measured by the SOGS-RA, present-oriented time perspective as measured by the CFC-14 Immediate scale, and gambling-related cognitive distortions as measured by the GRCS. Notably, the SOGS-RA item

Table 2 Pearson correlation coefficients among the study variables

	2	3	4	5	6	7	8	9	10	11
1. Age	0.092	0.045	0.083	0.382**	0.078	−0.016	−0.051	0.057	0.056	−0.004
2. SOGS-RA[a] Total score[l]	-	0.487**	−0.067	0.430**	0.529**	0.523**	0.450**	0.600**	0.612**	0.341**
3. CFC[b] – Immediate		-	−0.058	0.263**	0.440**	0.375**	0.423**	0.467**	0.461**	0.358**
4. CFC – Future			-	−0.079	−0.064	−0.183*	−0.069	−0.061	−0.087	−0.103
5. AUDIT[c]				-	0.399**	0.371**	0.335**	0.452**	0.444**	0.376**
6. GRCS[d] – Gambling Expectancies					-	0.670**	0.677**	0.704**	0.741**	0.447**
7. GRCS-Illusion of Control						-	0.674**	0.678**	0.721**	0.474**
8. GRCS – Predictive Control							-	0.579**	0.714**	0.423**
9. GRCS – Inability to Stop gambling[l]								-	0.694**	0.408**
10. GRCS – Interpretative Bias									-	0.441**
11. Chasing persistence										-

[a]South Oaks Gambling Screen - Revised for Adolescents; [l]Transformed scores; [b]Consideration of Future Consequences scale;

[c]Alcohol Use Disorders Identification Test; [d]Gambling Related Cognitions Scale

*p< 0.05; **p< 0.01 (Benjamini-Hochberg Adjusted p values)

assessing chasing behavior was significantly correlated with total ChasIT scores ($r = 0.33$, $p < 0.001$), supporting the convergent validity of the behavioral measure.

A chi-square test was conducted to examine whether the decision to continue playing after the initial phase of the ChasIT task differed by experimental condition. Chasing persistence, defined as the total number of trials played during phase two, was analyzed using a univariate ANOVA. Although a higher proportion of participants in the Loss condition, 38.9%, than in the Control condition, 28.7%, chose to continue playing, this difference did not reach statistical significance with ($\chi^2(1, N = 216) = 2.5$, $p = 0.15$). In contrast, chasing persistence was significantly greater in the Loss condition compared with the Control condition ($F_{1, 214} = 6.06$, $p < 0.05$, $\eta p^2 = 0.028$). Thus, the hypothesis for Research Question 1 was partially supported: loss exposure did not significantly influence the decision to initiate chasing but did significantly increase the persistence of chasing once participants continued playing.

Univariate ANOVAs comparing nonchasers and chasers revealed significant differences on all variables except the CFC-14 Future subscale ($F_{1, 214} = 0.26$, $p = 0.21$). Chasers demonstrated significantly higher scores on gambling severity as measured by the SOGS-RA ($F_{1, 214} = 25.95$, $p < 0.01$, $\eta p^2 = 0.108$). Chasers also showed higher present orientation as measured by the CFC-14 Immediate scale ($F_{1, 214} = 41.59$, $p < 0.01$, $\eta p^2 = 0.163$), and higher alcohol use as measured by AUDIT ($F_{1, 214} = 22.69$, $p < 0.01$, $\eta p^2 = 0.096$). Additionally, chasers scored significantly higher across all GRCS dimensions: Gambling Expectancies ($F_{1, 214} = 41.88$, $p < 0.01$, $\eta p^2 = 0.164$), Illusion of Control ($F_{1, 214} = 39.52$, $p < 0.01$, $\eta p^2 = 0.156$), Predictive Control ($F_{1, 214} == 30.90$, $p < 0.01$, $\eta p^2 = 0.126$), Inability to Stop ($F_{1, 214} = 35.81$, $p < 0.01$, $\eta p^2 = 0.143$), and Interpretative Bias ($F_{1, 214} = 34.49$, $p < 0.01$, $\eta p^2 = 0.139$).

Addressing Research Questions 2, 3, and 4 for chasing initiation, hierarchical logistic regression was conducted to identify predictors of the decision to continue gambling. The final model demonstrated good fit, as indicated by a nonsignificant Hosmer-Lemeshow test with ($\chi^2(8, N = 216) = 7.04$, $p = 0.53$). As reported in Table 3, age, present-oriented temporal perspective as measured by the CFC-14 Immediate scale, and scores on the GRCS Predictive Control and Illusion of Control subscales emerged as significant predictors of the decision to continue gambling, whereas gambling severity as measured by the SOGS-RA and alcohol use as measured by the AUDIT did not significantly contribute to the model. These

Table 3 Summary of logistic regression analysis with the choice to continue or stop gambling as the dependent variable

	B	SE	Wald	df	*p*	Odds ratio (95% CI)
Step 1						
Gender	0.046	0.326	0.020	1.000	0.887	1.048 (0.553–1985)
Age	0.530	0.180	8.635	1.000	0.003	1.699 (1.193–2.419)
Experimental Condition	0.508	0.324	2.453	1.000	0.117	1.661 (0.880-3.136)
GRCS[a] – Illusion of Control	0.273	0.054	25.632	1.000	0.000	1.314 (1.182–1.460)
Step 2						
Gender	0.121	0.342	0.125	1.000	0.723	1.129 (0.577-2.207)
Age	0.516	0.184	7.898	1.000	0.005	1.676 (1.169–2.403)
Eperimental Condition	0.455	0.340	1.790	1.000	0.181	1.577 (0.809-3.072)
CFC-14[b] - Immediate	0.111	0.028	16.166	1.000	0.000	1.117 (1.058–1.179)
GRCS – Illusion of Control	0.224	0.057	15.231	1.000	0.000	1.251 (1.118-1.400)

Dependent variable: Group (nonchasers/chasers); Model: $\chi^2 = 62.54$; Nagelkerke's $R^2 = 0.348$

Overall percentage accuracy rate = 77.8%

[a]Gambling Related Cognitions Scale; [b]Consideration of Future Consequences scale

results supported the hypotheses for Research Questions 2 and 3, confirming that gambling-related cognitive distortions and present-oriented time perspective predict chasing initiation. The results for Research Question 4 indicated that alcohol use did not predict chasing initiation, which is consistent with the hypothesis that alcohol may play a greater role in maintaining rather than triggering chasing behavior.

Addressing Research Questions 2, 3, and 4 for chasing persistence, hierarchical linear regression analysis identified predictors of the total number of trials completed during phase two. The final model accounted for approximatively a third of the total variance (R^2_{adj} = 0.313; $F_{7, 215}$ = 15.01, p<0.001).

As reported in Table 4, significant predictors included experimental condition (Loss), alcohol use (AUDIT), present orientation (CFC-14 Immediate scale), and the GRCS Predictive Control and Illusion of Control subscales. Consistent with the logistic regression results, gambling severity (SOGS-RA scores) was not a significant predictor in the final model. These results supported the hypotheses for Research Questions 2, 3, and 4 concerning chasing persistence, confirming that cognitive distortions, present orientation, and alcohol use all independently predict adolescents' persistence in chasing behavior once initiated.

Addressing Research Question 5, which asked whether cognitive distortions mediate the relationship between present orientation and chasing persistence or whether present orientation mediates the relationship between cognitive distortions and chasing persistence, two competing path analysis models were tested. Model 1 hypothesized that present orientation predicts chasing both directly and indirectly via the GRCS Predictive Control and Illusion of Control subscales. Model 2 proposed the reverse, with cognitive distortions predicting chasing directly and indirectly through present orientation. For both models, cognitive distortions were operationalized as a composite score summing the Predictive Control and Illusion of Control subscales. Observed power analyses indicated that the study had sufficient sensitivity to detect the hypothesized effects, with 0.92 power for direct path coefficients of $\beta \geq 0.13$ and 0.78 power for indirect mediation effects of ab=0.061 (Schoemann et al., 2017). These results suggest that the sample size was adequate to reliably test both direct and indirect pathways in the mediation models.

Model comparison confirmed superior fit for Model 2, in which cognitive distortions predict chasing both directly and indirectly through present orientation. Model 1 showed poor fit, with Satorra-Bentler $\chi^2(2)=20.59$, $p<0.001$, GFI=0.965, CFI=0.882, RMSEA=0.208 with a 90% confidence interval ranging from 0.132 to 0.293, and SRMR=0.074. In contrast, Model 2 exhibited excellent fit, with Satorra-Bentler $\chi^2(2)=3.79$, $p=0.15$, GFI=0.993, CFI=0.989, RMSEA=0.065 with a 90% confidence interval ranging from 0.000 to 0.163, and SRMR=0.030. Within the retained model shown in Fig. 1, the Loss condition with $\beta=0.13$ and $p<0.05$, present orientation with $\beta=0.14$ and $p<0.05$, cognitive distortions with $\beta=0.36$ and $p<0.001$, and alcohol use with $\beta=0.20$ and $p<0.001$ each significantly predicted chasing persistence. The path analysis confirmed that gambling-related cognitive distortions increase chasing persistence both directly and indirectly through their effect on fostering a present-oriented time perspective, with an indirect effect of $\beta=0.061$, $Z=2.10$, and $p<0.05$. These findings support the hypothesis for Research Question 5 that cognitive distortions represent the primary mechanism underlying chasing behavior, with present orientation serving as a mediating pathway rather than the reverse.

Table 4 Summary of hierarchical linear regression analysis with chasing persistence as the dependent variable

Variable	B	R^2_{adj}	ΔR^2	β	t	*p*	VIF
Step 1							
Gender	-0.766	−0.004	0.005	-0.071	-1.045	0.297	1.000
Experimental Condition Loss	-0.027			-0.005	-0.068	0.946	1.000
Step 2							
Gender	-0.782	0.019	0.028	-0.073	-1.079	0.282	1.000
Experimental Condition Loss	0.020			0.004	0.052	0.959	1.003
GRCS[a] - Illusion of Control	1.787			0.167	2.466	0.014	1.002
Step 3							
Gender	-0.104	0.231	0.213	-0.010	-0.161	0.872	1.019
Experimental Condition Loss	0.060			0.011	0.176	0.861	1.003
GRCS - Illusion of Control	1.528			0.143	2.378	0.018	1.005
AUDIT[b]	0.709			0.466	7.710	0.000	1.022
Step 4							
Gender	0.229	0.281	0.053	0.021	0.363	0.717	1.037
Experimental Condition Loss	-0.547			-0.096	-1.507	0.133	1.219
GRCS - Illusion of Control	1.415			0.132	2.276	0.024	1.007
AUDIT	0.559			0.367	5.779	0.000	1.207
CFC-14[c] - Immediate	0.334			0.275	3.971	0.000	1.432
Step 5							
Gender	0.318	0.303	0.025	0.030	0.511	0.610	1.040
Experimental Condition Loss	-0.548			-0.096	-1.534	0.126	1.219
GRCS - Illusion of Control	1.305			0.122	2.126	0.035	1.012
AUDIT	0.476			0.313	4.771	0.000	1.327
CFC-14 - Immediate	0.305			0.252	3.665	0.000	1.454
GRCS - Predictive Control	0.133			0.172	2.762	0.006	1.197
Step 6							
Gender	0.429	0.313	0.013	0.040	0.691	0.490	1.048
Experimental Condition Loss	-0.465			-0.082	-1.302	0.194	1.235
GRCS - Illusion of Control	1.318			0.123	2.164	0.032	1.012
AUDIT	0.340			0.223	2.828	0.005	1.952
CFC-14 - Immediate	0.285			0.235	3.420	0.001	1.476
GRCS - Predictive Control	0.110			0.142	2.239	0.026	1.265

B: unstandardized coefficient; R^2_{adj}: R square adjusted; ΔR^2: *R* square a change; β: standardized regression Coefficient; VIF: Variance Inflation Factor

[a] Gambling Related Cognitions Scale; [b]Alcohol Use Disorders Identification Test; [c]Consideration of Future Consequences scale

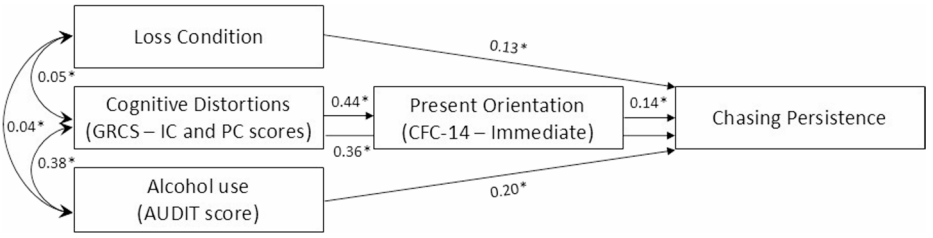

Fig. 1 Path diagram for model 2. *Note.* *Standardized solution

Discussion

Adolescence represents a particularly vulnerable developmental period for the emergence of gambling-related problems, with recent global estimates indicating a concerning prevalence within this age group (Tran et al., 2024). Early onset and greater severity of gambling behaviors during adolescence are associated with an elevated risk of persistent problems and related harms in adulthood. Consequently, strengthening research in this field is essential to inform evidence-based policies, prevention initiatives, early identification efforts, and targeted interventions (Czakó et al., 2025). Against this backdrop, the present study provides the first empirical examination of the interconnections among chasing behavior, gambling severity, cognitive distortions, time perspective, and alcohol use in a sample of Italian adolescents, while also testing competing mediation models to clarify the directional pathways underlying chasing persistence.

The experimental manipulation of monetary loss yielded a distinctive pattern of results that clarifies the role of situational factors in adolescent chasing. Exposure to loss did not significantly influence the decision to initiate chasing, but it exerted a significant effect on chasing persistence, with participants in the loss condition demonstrating substantially greater persistence than those in the control condition. This finding aligns with previous research (Cosenza et al. 2024; Lister et al. 2016; Nigro et al. 2018b, 2022; O'Connor and Dickerson 2003) and reinforces the view that the motivation to recoup losses primarily sustains continued chasing rather than triggering its initial onset. Importantly, even though the manipulation did not significantly affect chasing initiation, this null finding remains informative. It suggests that the decision to start chasing may be driven more by stable dispositional factors, such as cognitive distortions and time perspective, than by transient situational losses, whereas chasing persistence is more sensitive to loss exposure. Thus, regardless of the statistical significance of the manipulation, the experimental design provides critical information about the boundary conditions under which loss exposure influences adolescent chasing behavior.

A comparable pattern was observed for alcohol use. Alcohol consumption emerged as a significant positive correlate of chasing persistence, but not of the initial decision to chase. This finding converges with prior evidence suggesting that alcohol exacerbates gambling pathology (Cosenza et al., 2020, 2025; Kyngdon & Dickerson, 1999; O'Connor & Dickerson, 2003; Phillips & Ogeil, 2011; Sharma & Weinstein, 2025; Slutske et al., 2005). The observed association indicates that alcohol use may impair inhibitory control and intensify emotional dysregulation, thereby promoting continued gambling despite escalating losses. This dynamic is particularly concerning during adolescence, a developmental stage characterized by ongoing maturation of executive control systems and heightened neurobiological sensitivity to reward. The finding that alcohol use predicted persistence but not initiation is consistent with the hypothesis that alcohol plays a greater role in maintaining rather than triggering chasing behavior, suggesting that prevention efforts might profitably target alcohol use reduction specifically among adolescents who have already begun to chase losses.

Consistent with the study hypotheses, elevated scores on the GRCS Illusion of Control subscale and the CFC-14 Immediate scale were positively associated with both the decision to initiate chasing and the degree of chasing persistence. In addition, higher scores on the GRCS Predictive Control subscale uniquely predicted chasing persistence beyond the contribution of the other measures. Together, Illusion of Control and Predictive Control

form a complementary cognitive architecture that sustains chasing behavior by reinforcing the conviction that persistence can alter fortune or reveal hidden order in stochastic events. Illusion of Control refers to the mistaken belief that one can actively influence outcomes objectively determined by chance (Langer, 1975, 1983; Langer & Roth, 1975), reflecting a tendency to perceive luck as malleable and personally controllable (Langer, 1983; Toneatto, 1999). Predictive Control, closely related to the gambler's fallacy and the hot hand fallacy, involves the conviction that gambling outcomes can be anticipated, that losses presage imminent wins, or that a single win signals continued success (Cosenza et al., 2023). Critically, the association between these cognitive distortions and chasing persistence remained robust after controlling for overall gambling severity, underscoring the specific contribution of domain-specific irrational beliefs to the maintenance of maladaptive gambling patterns, independent of general problem gambling severity.

Both the initiation and persistence of chasing were also shaped by temporal myopia, consistent with prior research (Ciccarelli et al., 2019; Cosenza et al., 2020; Nigro et al., 2022). Adolescents who engaged in chasing exhibited a markedly stronger present orientation and diminished consideration of future consequences relative to nonchasers. This present-focused bias amplifies a central paradox of gambling decision making: wagering again to recover prior losses may appear immediately advantageous, yet it almost invariably results in further losses and escalating harm. The path analysis further clarified the directional pathways underlying these associations. Model comparison confirmed that cognitive distortions represent the primary mechanism underlying chasing, with present orientation serving as a mediating pathway rather than the reverse. Cognitive distortions exerted strong direct effects on persistence while also fostering a present-oriented temporal perspective that mediated additional indirect effects. This finding advances our understanding beyond prior work by establishing that irrational beliefs about gambling outcomes precede and give rise to a shortened temporal horizon, rather than present orientation simply coexisting with cognitive distortions as independent predictors.

Intriguingly, gambling severity, as measured by the SOGS-RA, failed to predict either chasing initiation or persistence despite a robust bivariate correlation with chasing scores. This dissociation indicates that chasing represents a distinct behavioral dimension separable from conventional diagnostic severity criteria. The finding is consistent with Toce-Gerstein and colleagues' (2003) dimensional framework and aligns with latent class analyses identifying chasers and nonchasers as discrete problematic gambling subtypes irrespective of symptom severity (Chamberlain et al., 2017; James et al., 2016; Kong et al., 2014). Although some studies have linked gambling severity to chasing (Auer & Griffiths, 2023; Ciccarelli et al., 2024; Lister et al., 2016; Yakovenko et al., 2018), the present results are consistent with Blaszczynski and Nower's (2002) pathways model insofar as they suggest that chasing proneness may represent a behavioral dimension separable from general gambling pathology. However, because the pathways model posits specific etiological pathways including behaviorally conditioned, emotionally vulnerable, and impulsive antisocial subtypes that were not directly assessed in the present study, these findings should be interpreted as broadly compatible with, rather than as direct empirical support for, this model. Future research should explicitly test whether chasers cluster into the predicted pathway subgroups using appropriate latent class or person-centered analytic approaches.

The present study offers novel behavioral evidence linking gambling-related cognitive distortions, temporal myopia, and alcohol use to chasing in adolescence, while also distin-

guishing between the predictors of chasing initiation and chasing persistence. The findings indicate that Illusion of Control and Predictive Control constitute distinct yet complementary distortions that sustain chasing behavior, with Predictive Control emerging as a unique predictor of persistence beyond other cognitive and behavioral measures. Importantly, these associations remained significant after accounting for overall gambling severity, suggesting that vulnerability to chasing reflects a functionally specific behavioral tendency rather than a simple manifestation of general problem gambling severity. Myopia for the future emerged as a second core process underlying chasing, with path analysis establishing gambling-related cognitive distortions as the primary mechanism driving loss-chasing, exerting strong direct effects on persistence while fostering a present-oriented time perspective that channeled additional indirect effects. The observed dissociation between chasing behavior and conventional indicators of gambling severity raises important conceptual and diagnostic considerations, supporting dimensional models that conceptualize chasing as a distinct risk pathway within the broader spectrum of gambling problems.

These findings carry significant practical implications for prevention and intervention that extend beyond well-established cognitive-behavioral principles. First, while most cognitive-behavioral protocols address general cognitive distortions such as the gambler's fallacy, the present results indicate that Predictive Control, the belief that one can predict gambling outcomes, and Illusion of Control, the belief that one can influence chance-determined outcomes, are particularly relevant to chasing persistence. Interventions might therefore incorporate specific modules that directly challenge these two distortion types using personalized feedback from behavioral chasing tasks, rather than treating all cognitive distortions as homogeneous. Second, the finding that present orientation mediates the effect of cognitive distortions on chasing suggests that episodic future thinking, a brief intervention that cues vivid imagery of future events, could be integrated into gambling prevention programs. Preliminary evidence supports the efficacy of episodic future thinking in reducing delay discounting in substance use disorders, and the present findings suggest it may be similarly useful for adolescent chasing behavior by counteracting the present-focused bias that amplifies persistent gambling. Third, given that 32.6% of the present sample met criteria for problematic alcohol use, school-based interventions that jointly target alcohol consumption and gambling-related cognitive distortions may be particularly effective, rather than addressing these behaviors in separate programs. Integrated prevention strategies that simultaneously address gambling-related irrational beliefs, present-oriented decision making, and alcohol use may offer superior efficacy compared to single-focus interventions. Screening for chasing proneness and its cognitive and temporal drivers may offer superior sensitivity over traditional severity measures for identifying adolescents at risk of persistent gambling harm, allowing for earlier and more targeted intervention efforts.

Limitations

While this study offers notable strengths, including a relatively large adolescent sample and the use of a behavioral task to capture chasing in real time, several methodological and conceptual limitations warrant consideration. First, the use of convenience sampling constrains the representativeness of the findings and limits their generalizability to broader populations. Relatedly, reliance on self-report instruments introduces the possibility of recall bias and socially desirable responding.

A second set of concerns pertains to the ecological validity of the chasing task. Although participants wagered with virtual rather than real currency, prior work indicates that only a minority of adolescents perceived the absence of tangible stakes as decisive in their task decisions (Nigro et al., 2019). The use of simulated incentives was ethically necessary to minimize harm when studying a vulnerable population. Nevertheless, the lack of real monetary consequences may have lowered the threshold for risk taking, potentially overestimating chasing behavior relative to real-world gambling contexts. An additional design feature of the ChasIT permits continued gambling after the depletion of initial credits. Although Banerjee and colleagues (2023) characterize this element as ecologically atypical, it mirrors authentic gambling scenarios in which individuals persist using borrowed funds, such as casino markers or informal loans, thus retaining relevance for understanding chasing in credit-based gambling environments.

A third limitation concerns the experimental manipulation itself. The loss condition bundled two distinct factors: loss experience itself and gambling with borrowed money, as participants in the loss condition continued gambling on credit after exceeding their starting budget while control participants retained their full budget and played with their own money throughout. Both factors plausibly drive persistence in the same direction, meaning that the observed condition effect cannot be attributed solely to loss-chasing. Gambling with borrowed money has its own separate literature on shifted risk-taking, and future research should attempt to disentangle these two mechanisms, for example by using a design that crosses loss condition (loss versus no loss) with credit condition (credit available versus not available). That said, the credit feature mirrors authentic gambling scenarios in which individuals persist using borrowed funds, such as casino markers or informal loans, thus retaining relevance for understanding chasing in credit-based gambling environments. Nevertheless, the confounding of loss experience and credit-based gambling should be considered when interpreting the experimental findings.

The operationalization of loss chasing also imposes interpretive boundaries. Our primary analytic focus was chasing persistence, measured as the number of wagering steps during the final phase of the task. Chasing initiation, while captured as a binary decision to continue after the first phase, reflects only one facet of a multidimensional construct. As Edson et al. (2023) underscore, chasing encompasses a wider spectrum of behavioral expressions, including escalating bet sizes, accelerated wagering speed, and diminished intervals between bets, none of which were assessed here.

An additional measurement consideration concerns the SOGS-RA. Although widely used in adolescent gambling research, the SOGS-RA was originally developed as a screening tool for identifying probable pathological gambling rather than as a continuous measure of gambling severity (Winters et al., 1993). Its item content focuses on dichotomous indicators of problematic gambling, such as “Have you ever gambled more than you planned to?“, which may not capture variance in gambling involvement within the non-problem range. This restricted range may have attenuated the association between severity and chasing in the multivariate models. Indeed, the bivariate correlation between SOGS-RA and chasing was significant, but its unique contribution disappeared when more proximal cognitive and motivational variables were entered. Future research should replicate these findings using alternative severity measures with greater sensitivity in the non-clinical range, such as the Gambling Consumption Scale or continuous measures of gambling frequency and expenditure.

Finally, although path analysis permitted examination of indirect effects and directional pathways, the cross-sectional design precludes causal inference. The proposed model should be interpreted as a theoretically grounded account of interrelations rather than evidence of temporal precedence or causality.

Conclusions

The present study offers novel behavioral evidence linking gambling-related cognitive distortions, temporal myopia, and alcohol use to chasing in adolescence, while also distinguishing between the predictors of chasing initiation and chasing persistence. The findings indicate that Illusion of Control and Predictive Control constitute distinct yet complementary distortions that sustain chasing behavior, with Predictive Control emerging as a unique predictor of persistence beyond other cognitive and behavioral measures. Importantly, these associations remained significant after accounting for overall gambling severity, suggesting that vulnerability to chasing reflects a functionally specific behavioral tendency rather than a simple manifestation of general problem gambling severity.

Myopia for the future emerged as a second core process underlying chasing. Adolescents engaging in chasing exhibited stronger present orientation and reduced consideration of future consequences, clearly differentiating chasers from nonchasers. The path analysis established gambling-related cognitive distortions as the primary mechanism driving loss-chasing, exerting strong direct effects on persistence while fostering a present-oriented time perspective that channeled additional indirect effects. This finding advances our understanding by clarifying the directional relationship between irrational beliefs and temporal orientation, demonstrating that cognitive distortions precede and give rise to a shortened temporal horizon rather than merely coexisting with it.

The experimental manipulation of monetary loss revealed an informative pattern. Loss exposure did not significantly influence the decision to initiate chasing but did increase chasing persistence once participants continued playing. This suggests that the motivation to recoup losses primarily sustains rather than triggers chasing behavior, and that the decision to start chasing may be driven more by stable dispositional factors such as cognitive distortions and time perspective than by transient situational losses. Similarly, alcohol use predicted chasing persistence but not initiation, indicating that alcohol may play a greater role in maintaining rather than triggering chasing behavior.

The observed dissociation between chasing behavior and conventional indicators of gambling severity raises important conceptual and diagnostic considerations. Gambling severity did not predict either the initiation or persistence of chasing once cognitive distortions and temporal orientation were taken into account, supporting dimensional models that conceptualize chasing as a distinct risk pathway within the broader spectrum of gambling problems. These findings are consistent with the notion that chasing proneness may represent a behavioral dimension separable from general gambling pathology, though future research should explicitly test the specific etiological pathways proposed by existing theoretical models.

These findings carry significant practical implications for prevention and intervention that extend beyond well-established cognitive-behavioral principles. First, while most cognitive-behavioral protocols address general cognitive distortions, the present results indicate

that Predictive Control, the belief that one can predict gambling outcomes, and Illusion of Control, the belief that one can influence chance-determined outcomes, are particularly relevant to chasing persistence. Interventions might therefore incorporate specific modules that directly challenge these two distortion types using personalized feedback from behavioral chasing tasks. Second, the finding that present orientation mediates the effect of cognitive distortions on chasing suggests that episodic future thinking, a brief intervention that cues vivid imagery of future events, could be integrated into gambling prevention programs to counteract the present-focused bias that amplifies persistent gambling. Third, given that nearly one third of the present sample met criteria for problematic alcohol use, school-based interventions that jointly target alcohol consumption and gambling-related cognitive distortions may be particularly effective, rather than addressing these behaviors in separate programs. Screening for chasing proneness and its cognitive and temporal drivers may offer superior sensitivity over traditional severity measures for identifying adolescents at risk of persistent gambling harm, allowing for earlier and more targeted intervention efforts.

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Data Availability The data that support the findings of this study are not openly available due to reasons of sensitivity and are available from the corresponding author upon reasonable request.

Declarations

Ethics approval The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the first author's institution. Participants were fully informed about the study objectives and procedures, and written informed consent was obtained prior to participation. Parental consent was obtained for all minors.

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