

Psychopathy and Fun-Seeking Predicting Alcohol Drinking: The Role of Thinking Styles

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INTRODUCTION: The study examined the effect of trait psychopathy and BAS fun-seeking on alcohol drinking and whether this effect is moderated by thinking styles. We hypothesized that psychopathy will indirectly predict alcohol drinking through BAS fun-seeking, moderated by experientiality and rationality. **METHODS:** The research sample of the cross-sectional study consisted of 241 working adults (47.30% men). Participants completed the Short Dark Triad, Behavioral Inhibition (BIS) and Behavioral Activation Scales (BAS), the Rational-Experiential Inventory-40, and the Health Behavior Inventory. **RESULTS:** Psychopathy indirectly predicted alcohol drinking through BAS fun-seeking. Experientiality significantly moderated the relationship between BAS fun-seeking and alcohol drinking. In the context of high experientiality, BAS fun-seeking predicted alcohol drinking positively and significantly. Rationality did not create a significant context for predicting alcohol drinking by BAS fun-seeking and psychopathy.

CONCLUSIONS: Moderated mediation analysis showed that thinking styles and individual differences in behavioral activation co-created psychological mechanisms underlying alcohol drinking in adults with traits of psychopathy.

Keywords | Fun-Seeking – Psychopathy – Thinking Styles – Alcohol Drinking – Rationality

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1 INTRODUCTION

In recent years, alcohol (mis)use has increased consistently (Alpers et al., 2021). Alcohol drinking generally belongs to risk factors for the global burden of disease and preventable death. Personality factors, individual differences, and underlying psychological mechanisms are essential for understanding the development of addictions and treatment (Jauk & Dieterich, 2019). Among alcohol abusers, there is a group of people characterized by a high level of antisocial traits such as fearlessness or dominance (Miranda et al., 2009). According to Neumann and Hare (2008), it is relevant to examine psychopathic traits with externalizing problems such as alcohol consumption in the general population.

Psychopathy is a multidimensional construct consisting of two main subtypes: primary (callousness, low emotional sensitivity), and secondary (anxiety, aggression, and impulsivity) (Karpman, 1941). In their Dark Triad model, Paulhus and Williams (2002) reviewed psychopathy as a combination of callousness and impulsivity. Dark trait psychopathy measured in the subclinical population (Jones & Paulhus, 2014) originates from Hare's lifestyle/antisocial facet (Hare, 2003), making conception closer to secondary than primary psychopathy. Dark trait psychopathy is measured as the facet of the Short Dark Triad scale (Jones & Paulhus, 2014) in the current study.

People with high levels of psychopathic traits may drink alcohol because of impulsivity and poor self-regulation (Jauk & Dieterich, 2019; Stenason & Vernon, 2016). Taking the perspective of reinforcement sensitivity theory (RST; Gray, 1987), alcohol drinking can be explained by differences in self-regulation, which is based on two neuro-psychological systems: behavioral inhibition (BIS) and behavioral activation (BAS). These systems overlap with impulsivity/anxiety, whereas BAS manifests itself in the activity following reward. In contrast, BIS inhibits behavior as a response to cues for punishment (Carver & White, 1994). Addictions and alcohol drinking are related to hyperactivated BAS (Franken et al., 2006). The mechanism that explains substance use in individuals with higher trait psychopathy remains a subject of interest (Stenason & Vernon, 2016). In empirical studies on psychopathy and alcohol drinking, BAS is important for understanding this relationship (LaLiberte & Grekin, 2015; Stenason & Vernon, 2016). However, the final decision on alcohol drinking combines emotional/motivational and cognitive/rational processes (Kuntsche et al., 2005).

1.1 Psychopathy, alcohol drinking, and self-regulation

Personality traits and models have been broadly examined in predicting health behavior. One of the most examined personality models in recent decades is a three-dimensional personality model Dark Triad comprising socially aversive personality traits, namely subclinical narcissism, Machiavellianism, and subclinical psychopathy (Paulhus & Williams, 2002). These traits are predictors of risky health behavior (Malesza

& Kaczmarek, 2021), alcohol (mis)use (Nnam et al., 2021; Malezsa & Kaczmarek, 2021), or harmful drinking (Nnam et al., 2021). Psychopathy, the most destructive of dark traits (Rauthmann & Kolar, 2012), is characterized by callousness, irresponsibility, and rule-breaking (Nnam et al., 2021). Individuals possessing high level of psychopathic traits struggle to regulate their impulses (Lasko & Chester, 2021; Jones & Paulhus, 2011) and are prone to be fun seekers (Włodarska et al., 2021) with significantly more reported accidents, addictions, and various diseases than the rest of the Dark Triad (Jonason & Zeigler-Hill, 2018).

Subclinical psychopathy is associated with characteristics of interpersonal antagonism and aspects of low conscientiousness, such as disinhibition (Jauk & Dieterich, 2019). Highly disinhibited people act impulsively and do not consider potential long-term consequences. They are disorganized, careless, and have little concern for others (Mulins-Sweatt et al., 2019). Disinhibition includes five lower-level traits: irresponsibility, impulsivity, distractibility, risk-taking, and lack of rigid perfectionism (Mulins-Sweatt et al., 2019). A high level of impulsivity relates to substance use (Lejuez et al., 2010), indicating difficulty with a delay of gratification (i.e., lowered ability to sustain a choice for a delayed reward) (Reynolds & Schiffbauer, 2005). Regarding psychopathy, addiction may be related to stimulation seeking, disinhibition, impulsivity, and reduced behavioral control when assessing short-term benefits versus long-term risks (Walsh et al., 2007; Jauk & Dieterich, 2019). Thus, it seems to be a "risky" combination for alcohol drinking when people have both, psychopathic traits and impulsive tendencies.

Reinforcement sensitivity theory (RST; Gray, 1987; Gray & McNaughton, 2000) offers a promising perspective on the problem. As noted above, theory introduced two neuro-psychological systems that control appetitive motivation: behavioral inhibition (BIS) and behavioral activation (BAS). Behavioral inhibition is responsible for avoidant behavior toward aversive stimuli. Greater BAS sensitivity reflects an inclination to engage in goal-directed efforts and a tendency to experience positive feelings in achieving rewards (Carver & White, 1994). In revised RST (Corr, 2008), BAS mediates reactions to all appetitive stimuli.

Three dimensions of BAS (reward-seeking, drive, fun-seeking) are specifically associated with impulsivity, while only fun-seeking is related to both, functional and dysfunctional impulsivity (Leone & Russo, 2009). Due to the hyperreactive dopamine system (Buckholtz et al., 2010), psychopathy is consistently related to dysfunctional impulsivity (Jones & Paulhus, 2011) and fun-seeking (Włodarska et al., 2019). Fun-seeking is the strongest BAS predictor of risky health behavior (Voigt et al., 2009), and from all three dimensions of the BAS system, fun-seeking alone has been positively associated with alcohol drinking across subclinical samples (O'Connor et al., 2009; Yen et al., 2009). In this vein, fun-seeking predicts drinking identity and craving for alcohol in undergraduates (Lindgren et al., 2013). In a sample of healthy adults, excitement-seeking has been found to predict alcohol (mis)use (Pitel & Gurňáková, 2016).

According to Carver and White (1994), extremely high levels of BAS and, at the same time, low BIS systems are associated with sociopathic personality. Further, strong BAS and normal levels of BIS have been linked to secondary psychopathy (Newman et al., 2005).

Results from a meta-analysis showed that from all three BAS dimensions, fun-seeking particularly is related to dark trait psychopathy (Włodarska et al., 2021). In the traditional view, BIS/BAS is a biological/temperamental predisposition to personality traits (Gray, 1987). However, in a novel perspective derived from cognitive-adaptive theory (CAAT; Matthews, 2016), traits are not directly reflected in brain systems, but correspond to self-knowledge and skills that facilitate adaptation. Activation (BAS) or arousal only indirectly influences skill acquisition and, thus, personality adaptation (Matthews, 2018), but BAS mediates reaction to stimuli (Corr, 2008). The theoretical model of the current study reflects these assumptions.

To summarize, psychopathic traits predict alcohol (mis)use, and those with higher level of trait psychopathy are susceptible to disinhibition, impulsivity, and fun-seeking, which may predict and reinforce their tendency to alcohol (mis)use. Prompt identification of those who are at risk may have implications for practitioners.

As previously suggested (Taubitz et al., 2015), each BAS subscale should be examined separately in a specific context. Based on the above, we have chosen BAS fun-seeking exclusively for our study because of its empirical relation to alcohol drinking and the trait of psychopathy.

Given the above, we have proposed the following hypotheses.

H1: Psychopathy significantly positively predicts fun-seeking.

H2: Fun-seeking significantly positively predicts alcohol drinking.

H3: Psychopathy significantly positively predicts alcohol drinking.

H4: The relationship between psychopathy and alcohol drinking is mediated by fun-seeking.

1.2 Thinking styles

According to cognitive-experiential self-theory (CEST; Epstein, 1994), people dually process information via two interactive systems: rational and experiential. The rational mode operates primarily on a conscious level and is analytical, deliberate, verbal, and non-affective. The experiential (empirical) mode is heuristic, intuitive, highly associative, and affective and is based on impressions from an event. Two thinking styles derived from the CEST – rational and experiential – are independent, interactive, and changeable. Individual preferences exist for one, both, or neither thinking style (Brown & Bond, 2015). Both styles have evolved to be adap-

tive for specific contexts. A “wrong” context may be when individuals prefer an experiential style in a situation when a rational style is needed, such as investing large amounts of money based on “gut feelings” (Kahneman, 2019). To summarize, thinking styles offer promising context in trait-outcome relationships.

The rational thinking style is related to psychological stability (Pacini & Epstein, 1999). Experiential thinking style is less deliberative and more impulsive (Stanovich & Stanovich, 2010). In general, rationality can protect against risky health behavior (Swami & Barron, 2021). The lowest rationality profiles of adults are related to the highest use of substances (Phillips & Vince, 2019). Individuals at risk of abusing substances may benefit from strategies that increase cognitive control. The decision-making process regarding alcohol drinking comes from a rational component. However, this process is not always conscious (Kuntsche et al., 2005).

Healthy self-regulation manifests in mental resilience, stability, and increased cognitive ability to reassess one’s behavior (Taubitz et al., 2015). Increased cognitive ability is related to rational thinking style (Pacini & Epstein, 1999). Within the context of addiction, the dual process model proposes that the balance between impulsive and reflective (rational) processes is disturbed (Wiers et al., 2016). In short, both processes are essential in the mechanism of addiction. In the experimental study, the faster (more intuitive) the adolescent’s response to stimuli of words with alcohol in the probe task, the greater their willingness to drink (Gibbons et al., 2016). Therefore, experiential processes should not be omitted. Reyna and Farley (2006) suggested that adults resist risky behavior not because of conscious consideration, but because they intuitively understand the essence of dangerous situations and consequences. On the contrary, impulsive gamblers who are highly behaviorally activated do not prefer an irrational cognitive style (MacLaren et al., 2012). This implies that different cognitive-emotional mechanisms may explain different addictive behaviors.

In the study examining psychopathy and alcohol drinking (Miranda et al., 2009), individuals who persistently engage in impulsive and antisocial behavior may be prone to alcohol drinking due to their propensity toward decision-making biases that favor immediate reward despite subsequent negative consequences. Moreover, impaired decision-making in antisocial alcohol (mis)users was not present or was less pronounced in their non-antisocial counterparts (Petry, 2002).

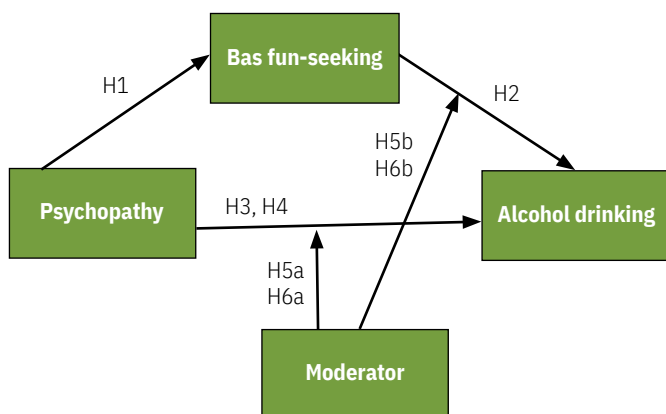
1.3 Study goal

The current study’s complex model comprises cognitive and motivational/emotional correlates. A theoretical model is based on the current view on the trait-outcome link, suggesting that contextual variables are critical in explaining trait-related behavior (Matthews, 2018). RST theory is a well-established framework for understanding human motivation. However, cognitive psychology researchers have criticized the theory (Matthews, 2008). For instance, Matthews (2008) reevaluates

a major dilemma: Is the effect of trait on stimuli response directly mediated by sensitivity to reward/punishment as the reaction to stimulus may be processed through cognitive appraisal? As shown in the traditional cognitive psychology model (Matthews, 2008), information processing is a necessary factor that influences emotion and consequently lead to response (behavior). A theoretical model of the present study is built on these presumptions.

To date, no researchers have mapped the thinking styles as context for the relationship between psychopathy, fun-seeking, and alcohol drinking frequency. Based on the above, psychopathy is related to fun seeking and overuse of drugs and alcohol. Fun seeking predicts alcohol (mis)use, so we presume that fun seeking mediates the prediction of alcohol drinking by psychopathy. The cognitive-affective mechanism underlying alcohol drinking regarding psychopathy is less clear. However, empirical evidence shows that both contribute to substance use (Brand et al., 2021). Based on empirical re-

Figure 1 | The research model



search (Miranda et al., 2009; Gibbons et al., 2016; Phillips & Vince, 2019; Swami & Barron, 2021; Wiers et al., 2016), we hypothesize that the effects of psychopathy and fun seeking on alcohol drinking are moderated by experientiality and rationality. We assume the following.

H5a: Experientiality positively moderates the relationship between psychopathy and alcohol drinking, so that increased experientiality strengthens this relationship.

H5b: Experientiality positively moderates the relationship between fun-seeking and alcohol drinking, so that increased experientiality strengthens this relationship.

H6a: Rationality negatively moderates the relationship between psychopathy and alcohol drinking, so that increased rationality weakens this relationship.

H6b: Rationality negatively moderates the relationship between fun-seeking and alcohol drinking, so that increased rationality weakens this relationship.

2 METHODS

2.1 Participants and procedures

The research sample comprised 241 working adults (47.30% men; $M_{age} = 37.58$ years). We applied a snowball method for data collection. Participants were invited to participate in the online survey via Facebook and LinkedIn. The online questionnaire included informed consent, followed by the research scales we refer to below, with three control questions added. The following demographic variables were monitored: occupation, age, education, and gender. Of the participants, 34.43% were entrepreneurs (59.03% men), 60.99% were employees (57% men), and 4.5% (72.72% men) were defined as both. The educational achievements of the participants were as follows: elementary education (1.65%, 50% men); a certificate of apprenticeship (4.56%, 72.72% men); high school education (27.80%, 44.77% men); a bachelor's degree (8.71%, 47.61% men); a master's degree (47.72%, 48.69% men); and a doctorate (6.22%, 40% men).

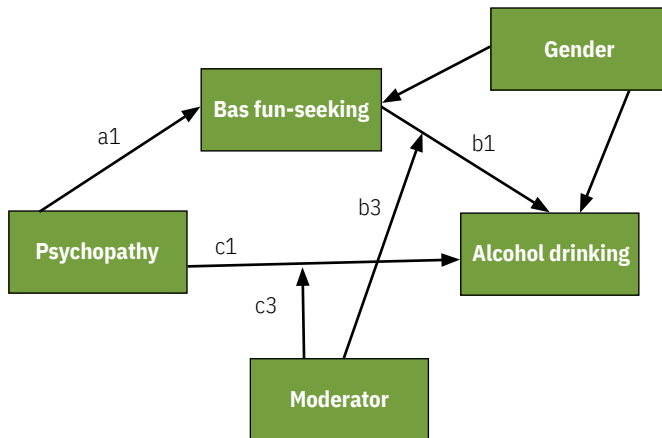
Upon incorrect responses to the attention check items, 11 participants were excluded from the analysis (reducing the sample from 252 to 241). The statistical power analysis by G-Power 3.1.9.7 for the multiple linear regression model showed that with ten predictors, $\alpha = 0.05$, and power = 0.95, the sample size should be $N = 107$. The current sample size $N = 241$ is sufficient for the multiple linear regression analysis.

All completed questionnaires were anonymous. Participants agreed that the results would be used only for research purposes. There was no foreseeable intended or unintended adverse impact on participants.

2.2 Measures

The Rational-Experiential Inventory (REI) scale was developed by Pacini and Epstein (1999) based on the cognitive-experiential theory (CEST; Epstein, 1994). The scale measures two styles of thinking using two dimensions. REI-R is based on the need for cognition. It includes rational ability and rational attitude. It measures rational information processing (e.g., *I have a logical mind*). REI-E expresses faith in intuition. It includes experiential ability and experiential attitude and measures intuitive information processing based on past impressions (e.g., *I believe in trusting my hunches*). The scale showed excellent internal consistency when it was created (Pacini & Epstein, 1999): REI-R $\alpha = 0.90$ and REI-E $\alpha = 0.78$. When analyzing validity, the scale showed the strongest correlations between rationality and neuroticism ($r = -.34$) and conscientiousness ($r = .24$). Experientiality correlated most strongly with conscientiousness ($r = .25$). Ballová-Mikušková et al. (2015) translated and standardized the scale into the Slovak language. A psychometric analysis of the Slovak translation on a sample of university students showed good internal consistency (REI-R $\alpha = 0.86$; REI-E $\alpha = 0.87$). The participants responded on a Likert scale (1 = absolutely disagree; 6 = absolutely agree) with good internal consistency (REI-R $\alpha = .89$, $\omega = .89$, REI-E $\alpha = .91$; $\omega = .91$). Two-factor model of the current study has an acceptable fit with the data $X^2(N = 241; df = 739) = 1814.51; p < .001; TLI = .97; CFI = .97; RMSEA = .08; SRMR = 0.05$.

Figure 2 | Path diagram of the moderated mediation analysis (moderated b-path and moderated c'-path, controlled for gender)



The Behavioral inhibition system and behavioral activation system scales (BIS/BAS scale; Carver & White, 1994) include 20 items, divided into one dimension of BIS and three dimensions of BAS. After creating the RST theory (Gray, 1977), a consensus was reached on the measurement of both behavioral systems. BIS contains 7 items and measures sensitivity to punishment (e.g., *I worry about making mistakes*) and the tendency to react in an avoidant and anxious way in socially aversive situations. BAS contains three dimensions: Reward Responsiveness (5 items, e.g., *When I'm doing well at something, I love to keep at it*) measures the level of experiencing a positive response to rewards. Drive (4 items, e.g., *I go out of my way to get things I want*) measures persistence in achieving goals. Fun-seeking (4 items, e.g., *I crave excitement and new sensations*) measures the level of desire for new psychological rewards and the tendency to seek new rewards based on the momentary stimulus. In the original study (Carver & White, 1994), the internal consistency for BIS was $\alpha = 0.74$; the values for the BAS scales were 0.73, 0.76, and 0.66. Construct and discriminant validity demonstrated relationships with Manifested Anxiety – MAS ($r = .58$), Tridimensional Personality Questionnaire – TPQ ($r = .59$), and Life Orientation Test – LOT ($r = -.22$). The scale has not yet been standardized in the Slovak language, but it has been successfully used in the published study (Lisá & Valachová, 2023). In the current study, we used the BAS fun-seeking subscale (4 items). It measures the extent to which a person is motivated by a desire to seek out and approach fun activities ($\alpha = 0.79$; $\omega = 0.78$). The participants responded on a Likert scale (1 = strongly disagree; 4 = strongly agree) with an average gross score ranging from 1 to 4. The one-factor model fits adequately with the data $X^2(N = 241; df = 6) = 456.38$; $p < .001$; $TLI = .98$; $CFI = .99$; $RMSEA = .08$; $SRMR = 0.05$.

The Short Dark Triad scale (SD3; Jones & Paulhus, 2014) measures socially aversive personality traits (Machiavellianism, narcissism, psychopathy). The authors designed the method on the following questionnaires: Narcissistic Personality Inventory - NPI (Raskin & Hall, 1979), Machiavellianism scale Mach-IV (Christie & Geis, 1970), Self-Report Psychopathy Scale SRP-III (Hare & Neumann, 2008). The psychometric proper-

ties of the instrument were supported by their study on a sample of working adults ($N = 739$): Machiavellianism $\alpha = 0.73$, Narcissism $\alpha = 0.77$ and Psychopathy $\alpha = 0.80$. The final version of the SD3 contains 27 items, with 9 statements for each trait. Machiavellianism measures the tendency to manipulate others for personal gain. Narcissism measures the level of feeling exceptional and superior. Psychopathy detects tendencies towards aggression and risk-taking behavior. In the original study (Jones & Paulhus, 2014), the authors measured validity by comparing the dimensions with measures of similar constructs: Narcissism and NPI ($r = .70$), Machiavellianism and MACH IV ($r = .68$), and Psychopathy and SRP-III ($r = .78$). In the previous study (Lisá & Valachová, 2021), adequate values of internal consistency for narcissism $\alpha = 0.75$, Machiavellianism $\alpha = 0.71$, and psychopathy $\alpha = .71$ have been found. The Slovak version of the scale was adapted by Čopková and Šafár (2021), where confirmatory factor analysis (CFA) confirmed 3 factors. Their model had an acceptable data fit ($RMSEA = 0.062$, $TLI = 0.94$, $CFI = 0.95$). For the current study, participants completed nine subclinical psychopathy items (for example, 'I tend to avoid dangerous situations'; $\alpha = 0.67$; $\omega = 0.67$) on a Likert scale (1 = completely disagree; 5 = completely agree). The one-factor model fits adequately with the data $X^2(N = 241; df = 20) = 34.592$; $p = .02$; $TLI = .94$; $CFI = .96$; $RMSEA = .05$; $SRMR = 0.07$.

The Health Behavior Inventory (HBI) was adapted by Daughtery and Brase (2010) to measure indicators of general health behaviors. The inventory contains 9 items that assess health behavior (e.g., *I drink alcohol*). In the current study we used the measurement for frequency of alcohol consumption. Participants respond on how often they drink alcohol (1 = rarely or never; 2 = occasionally; 3 = often; 4 = almost always or always).

2.3 Data analyses

We applied lavaan-based path analysis with JASP 0.16.3 structural equation modeling. To evaluate whether BAS fun-seeking mediates the association between psychopathy and alcohol drinking and whether the indirect effect is further conditional on levels of rationality/experientiality, we tested a moderated mediation model using an ML estimator. The Index of Moderated Mediation (IMM) was tested with a 95% bias-corrected percentile bootstrap confidence interval based on 5000 replications. The moderator values in conditional indirect effects were the mean and +/- SD from the mean: low (CIEL, mean -1SD), moderate (CIEM, mean) and high level (CIEH, mean + 1SD). The dependent variable, alcohol drinking, was mean-centered prior to analysis.

2.4 Compliance with ethical standards

The study was approved by the ethics committee of the Faculty of Social and Economic Sciences, Comenius University in Bratislava under number 216-12/2023. The study was performed according to the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. All human participants signed the informed consent in an online form.

Table 1 | Descriptive statistics and Pearson's partial correlation among variables

Variable	M	SD	Min	Max	1	2	3	4	5	6	7
1. Alcohol drinking	2,03	0,77	1	4	—						
2. BAS fun-seeking	2,86	0,68	1	4	.145*	—					
3. Psychopathy	1,91	0,6	1	4,25	0,096	.280***	—				
4. Rationality	4,35	0,75	1,7	5,75	-0,059	0,077	0,042	—			
5. Experientiality	3,89	0,83	2,1	6	0,115	.253***	-0,077	-0,023	—		
6. Age	37,58	7,74	20	78	-0,057	-0,072	0,048	0,086	0,64	—	
7. Gender			1	2	-0,078	0,045	-.324***	-0,093	.292***	-0,068	—
Mmen					2,1	2,83	2,12	4,43	3,64	38,13	
SDmen					0,78	0,67	0,6	0,67	0,79	6,36	
Mwomen					1,98	2,89	1,72	4,29	4,12	37,08	
SDwomen					0,76	0,69	0,55	0,82	0,81	8,79	

Note: * $p < .05$, ** $p < .01$, *** $p < .001$; gender: 1= men, 2 = women

3 RESULTS

Alcohol drinking correlated (*Table 1*) with BAS fun-seeking ($r = .145^*$). BAS fun-seeking correlated with psychopathy ($r = .280^{***}$) and experientiality ($r = .253^{***}$). Psychopathy correlated with gender ($r = -.324^{***}$). Experientiality correlated with gender ($r = -.292^{***}$). Men scored higher on psychopathy [$t(239) = 5.3$; $p < .001$; $d = .68$] and lower on experientiality [$t(239) = -4.7$; $p < .001$; $d = -.61$].

H1 was supported. Psychopathy significantly predicts BAS fun-seeking ($B = 0.369$; 95% CI [0.24, 0.50]). H2 was supported. BAS fun-seeking predicts alcohol drinking significantly ($B = 0.218$; 95% CI [0.02, 0.03]). H3 was not supported; psychopathy does

not significantly predict alcohol drinking ($B = 0.134$; 95% CI [0.23, -0.08]). H4 was supported. The relationship between psychopathy and alcohol drinking is mediated by BAS fun-seeking (Indirect effect: $B = 0.059$; 95% CI [0.01, .14]). *Figure 2* shows the path diagram of the moderated mediation analysis.

Table 2 showed a significant a-path (a1) from psychopathy to BAS fun-seeking ($B = 0.370$, 95% CI [0.24, 0.50]) in the context of rationality. There was not a significant interaction between BAS fun-seeking and alcohol drinking for the b-path (b1) ($B = -0.017$, 95% CI [-1.02, 0.83]). The direct effect (c1) of psychopathy on alcohol drinking was not significant ($B = -0.743$, 95% CI [-2.12, 0.61]). The moderated mediation index was insignificant ($B = 0.020$, 95% CI [-0.05, 0.11]). We found no evi-

Table 2 | Moderated mediation results (rationality for moderator)

Regression coefficients							95%CI	
Predictor	Outcome	Estimate	SE	z-value	p	LL	UL	
Psychopathy	Fun-seeking	a1	.370	.073	5.092	<.001	.236	.497
Gender	Fun-seeking		.206	.088	2.344	.019	.032	.375
Psychopathy	Alcohol drinking	c1	-.743	.649	-1.144	.252	-2.116	.611
Rationality	Alcohol drinking	c2	-.585	.283	-2.067	.039	-1.240	.072
Interaction	Alcohol drinking	c3	.179	.145	1.238	.216	-.113	.490
	Alcohol drinking							
Fun-seeking	Alcohol drinking	b1	-.017	.098	-.173	.862	-1.021	.830
	Alcohol drinking							
Interaction		b3	.054	.023	2.393	.017	-.150	.278
Gender			-.192	.138	-1.388	.165	-.452	.080
	IMM		.020	.009	2.166	.030	-.054	.109
Defined	CIEL		.066	.049	1.351	.177	-.020	.169
parameters	CIEM		.081	.054	1.507	.132	.015	.177
	CIEH		.096	.059	1.626	.104	.005	.223

Table 3 | Moderated mediation results (experientiality for moderator)

Regression coefficients							95%CI	
Predictor	Outcome		Estimate	SE	z-value	p	LL	UL
Psychopathy	BAS fun	a1	.370	.073	5.092	<.001	.239	.503
Gender	BAS fun		.206	.088	2.344	.019	.034	.375
Psychopathy	Alcohol drinking	c1	.332	.462	.719	.472	-.669	1.252
Experientiality	Alcohol drinking	c2	-.548	.253	-2.169	.030	-1.176	.105
Interaction	Alcohol drinking	c3	-.064	.119	-.534	.593	-.299	.196
	Alcohol drinking							
Bas fun	Alcohol drinking	b1	-.947	.097	-9.805	<.001	-1.909	-.027
	Alcohol drinking							
Interaction		b3	.282	.025	11.295	<.001	.048	.528
Gender			-.190	.142	-1.388	.181	-.461	.087
	IMM		.104	.022	4.642	<.001	.023	.221
Defined	CIEL		-.032	.046	-.688	.492	-.144	.072
parameters	CIEM		.055	.052	1.061	.289	-.014	.149
	CIEH		.142	.063	2.253	.024	.043	.284

dence of moderated mediation. The results were controlled for gender. H6a and H6b were not supported.

Table 3 showed a significant a-path (a1) from psychopathy to BAS fun-seeking ($B = 0.370$, 95% CI [0.24, 0.50]) in the context of experientiality. There was a significant interaction between BAS fun-seeking and alcohol drinking for the b-path (b1) ($B = -0.947$, 95% CI [-1.91, -0.03]). The direct effect (c1) of psychopathy on alcohol drinking was not significant ($B = 0.332$, 95% CI [-0.67, -1.25]). The index of moderated mediation was significant ($B = 0.104$, 95% CI [0.02, 0.22]). We found evidence for moderated mediation. The indirect conditional effect was significant for the high level of experientiality ($B = 0.142$, 95% CI [0.04, 0.28]). The results revealed that BAS fun-seeking mediated the association between psychopathy and alcohol drinking in participants with a high level of experientiality. However, there was no evidence of an indirect effect for participants with low ($B = -0.032$, 95% CI [-0.14, 0.07]) and moderate ($B = 0.055$, 95% CI [-0.01, 0.15]) levels of experientiality. The results were controlled for gender. H5a was not, and H5b was supported.

The slope analysis serves for a better understanding of the nature of the moderating effects. Experientiality significantly moderates the relationship between BAS fun-seeking and alcohol drinking (95% CI [0.023, 0.221]), which means that the slopes are significantly different from each other (Figure 3). At a low level of experientiality, the relationship between BAS fun-seeking and alcohol drinking is negative and not significant (95% CI [-0.144, 0.072]), so at a medium level (95% CI [-0.014, 0.149]). The relationship between alcohol drinking and BAS fun-seeking is not significant at low and medium experientiality. However, the line tends to straighten and be positive at a higher level of experientiality. At higher experientiality, an

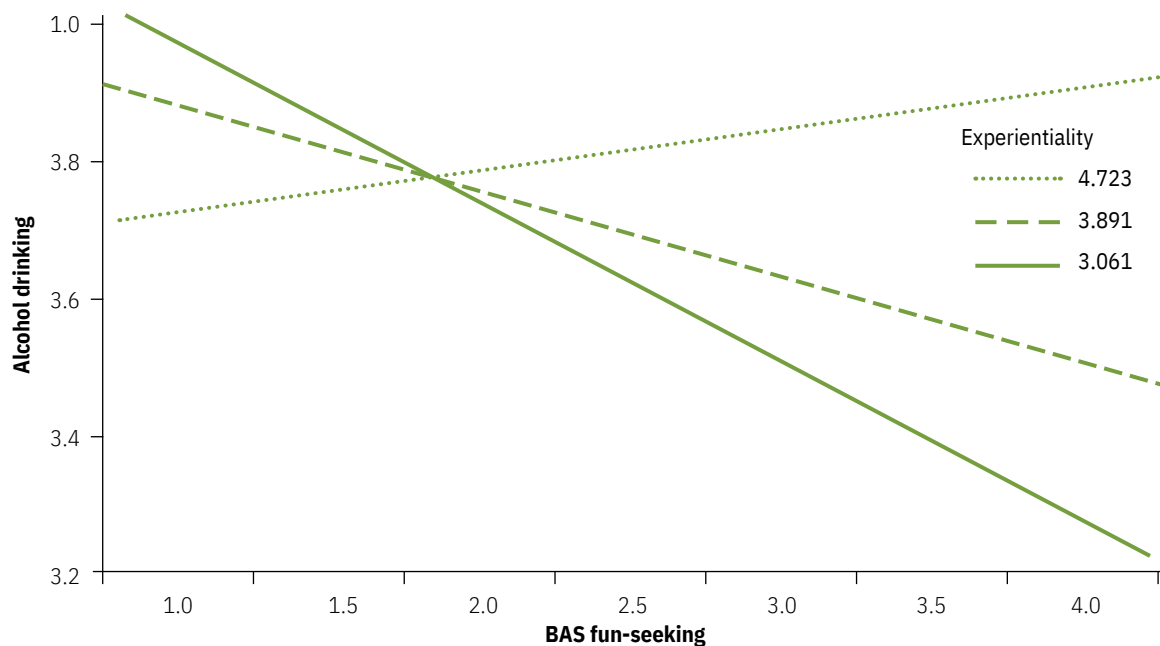
increase in BAS fun-seeking leads to a similar change in alcohol drinking; the change is positive. Higher experientiality strengthens the positive relationship between fun-seeking and alcohol drinking. The moderating effect of high experientiality (Table 3) is statistically significant (95% CI [0.043, 0.284]).

The data shows significant findings regarding the associations between psychopathy, BAS fun-seeking, rationality, experientiality, and alcohol drinking (controlled for sex). The moderated mediation analysis reveals important insights into how variables affect each other under different conditions, particularly when considering experientiality as a moderator.

The regression coefficients and associated statistics in Tables 2 and 3 reveal compelling patterns and interactions among the variables examined in the study. The analyses show the direct effects of psychopathy on fun-seeking behavior and alcohol consumption and the moderating role of high experientiality in shaping these relationships. The moderated mediation results provide valuable insights into the conditional indirect effects of psychopathy on alcohol consumption, mediated by BAS fun-seeking behavior, across different levels of experientiality. The significant findings of the slope analysis further elucidate how experientiality moderates the relationship between BAS fun-seeking behavior and alcohol consumption, emphasizing the importance of considering individual differences in experientiality when examining these associations.

4 DISCUSSION

The study aimed to analyze whether thinking styles can moderate the indirect effect of psychopathy on alcohol consumption mediated through BAS fun-seeking. Moderated mediation

Figure 3 | Experientiality as a moderator of BAS fun-seeking predicting alcohol drinking

models are helpful when researchers focus on understanding why and under what conditions variables are related. Such analyses provide an opportunity for simultaneous investigation of contingent and indirect effects (Edwards & Konold, 2020). In the current moderated mediation model, psychopathy was defined as the independent variable (X), alcohol drinking as the dependent variable (Y), and BAS fun-seeking as the mediator (M). The relationship between psychopathy and alcohol drinking was partially explained by BAS fun-seeking. Individuals with psychopathic traits are more likely to engage in BAS fun-seeking behaviors, potentially driving increased alcohol use. Psychopathy significantly predicted BAS fun-seeking. There was a significant interaction between BAS fun-seeking and experientiality in predicting alcohol drinking - the core of the moderating effect. There was no direct effect of psychopathy on alcohol drinking when controlling for sex. The index of moderated mediation showed that experientiality acts as a moderator statistically significantly.

The slope analysis further illuminated the interaction between BAS fun-seeking, experientiality, and alcohol drinking. When experientiality was high, increasing BAS fun-seeking behaviors strongly correlated with greater alcohol drinking. Individuals with a higher levels of experientiality could be more likely to turn to alcohol as a maladaptive coping mechanism to deal with the emotional consequences of fun-seeking behaviors. This could result in a stronger link between fun-seeking and alcohol drinking. When experientiality is low, the association between fun-seeking behaviors and alcohol drinking becomes less pronounced. According to CEST, individuals who are higher in experientiality favor the preconscious, affect-laden, and rapid experiential system in their thinking and decision-making. Those lower in experientiality rely more heavily on conscious, analytical, and effortful thinking (Epstein, 2016). Low

experientiality may attenuate the negative impact of fun-seeking on alcohol problems. Individuals preferring experientiality need to find other outlets for fun and stimulation beyond alcohol. If they were less experiential and impulsive, their focus on seeking novel experiences could provide a defense against becoming overly dependent on alcohol to satisfy those needs, for example, by making more mature choices.

Our expectation was based on the literature and theoretical ground, which implies that cognitive processes are essentially rooted within decision-making in risky health behaviors or addictions (Wiers et al., 2016; Gibbons et al., 2016; Phillips & Vince, 2019). Based on substantial empirical research on subclinical psychopathy, RST, and health-related behavior (Włodarska et al., 2021; Nnam et al., 2021; Malezsa & Kaczmarek, 2021), we expected psychopathy and fun-seeking to predict alcohol drinking. Furthermore, we expected that rationality and experientiality would moderate the effect.

The results of the present study support the first hypothesis. We examined the predictive power between variables. As we assumed, psychopathy predicted fun-seeking behavioral activation (Włodarska et al., 2021). The explanation focuses on the potentially maladaptive character of the fun-seeking construct (Leone & Russo, 2009). Particularly, as we have mentioned in the introduction part, there are two main subtypes of psychopathy: primary (emotionally stable) and secondary (antisocial, aggressive) (Hicks et al., 2004). Empirical studies show that fun-seeking is related to secondary psychopathy (Hughes et al., 2012), which has an empirical overlap with maladaptive and impulsive behavior. In addition, impulsivity and thrill-seeking are crucial elements of subclinical psychopathy measured in our research sample (Paulhus & Williams, 2002).

In the second hypothesis, we assumed that fun-seeking is a predictor of alcohol drinking. There is a large consensus that high BAS activity is related to addictions in various samples (Franken et al., 2006; Voigt et al., 2009; O'Connor et al., 2009; Lindgren et al., 2013). Fun-seeking predicted alcohol drinking in the research sample, which is in line with previous research, and thus it supports the second hypothesis.

In the third hypothesis, we assumed that psychopathy predicts alcohol drinking. We did not confirm the third hypothesis. This result contradicts previous findings (Malesza & Kaczmarek, 2021; Nnam et al., 2021). The explanation may lie in the age range of the current research sample, which was quite wide (from 20 to 78). The reasons for alcohol drinking may vary with age, which could affect the non-significance of the results compared to more age-homogeneous research samples. Another possible explanation is that there is an indirect effect of psychopathy on alcohol drinking and the conditioned effect of fun-seeking.

As we assumed in the fourth hypothesis, the relationship between psychopathy and alcohol drinking was indirect, mediated by fun-seeking. This result aligns with previous findings (LaLiberte & Grekin, 2015) and is inconsistent with others (Stenason & Vernon, 2016). Different research samples and instruments might cause this inconsistency. Specifically, in these studies, all three BAS subscales (BAS reward, BAS fun-seeking, BAS drive) have been measured as one factor. Instead, we intentionally chose only the BAS fun-seeking dimension due to its solid empirical overlap with psychopathy (Wlodarska et al., 2019), alcohol (mis)use (O'Connor et al., 2009), and impulsivity (Leone & Russo, 2009). Another reason for choosing BAS fun-seeking exclusively is that "BAS is multidimensional, and researchers should not rely on a single BAS total score" (Taubitz et al., 2015, p. 8.). Our results show that fun-seeking may overlap with dysfunctional impulsivity (Leone & Russo, 2009) and risky health behavior (Voigt, 2009), as previously found. We also suggest using the fun-seeking subscale independently as a separate subscale when analyzing the context of maladaptive behavior (Taubitz et al., 2015).

Finally, we have tested moderated mediation models. The results showed that the indirect effect of psychopathy on alcohol drinking (mediated by fun-seeking) is moderated by experientiality. Psychopathy and fun-seeking in the context of high experiential thinking are risky for alcohol drinking in our sample. This is in line with our expectations because fun-seeking and experientiality are related to impulsivity, spontaneity, affection, and emotions. High experientiality may be a risk factor for the relationship between alcohol drinking and BAS fun-seeking. Our result is also in line with previous findings in which dual-process addiction models suggest that a disturbed balance between impulsive (experiential) and reflective processes plays a role in developing and maintaining substance use disorders (Wiers et al., 2016).

The results indicate that low experientiality may be beneficial in weakening of natural reward-approaching tendencies. Recognition of the experientiality level could help prevent alcohol drinking in people with high fun-seeking. In previous stud-

ies, high fun-seeking was found to be a risk factor for alcohol drinking (Franken et al., 2006). In summary, our findings show that the risk factor for alcohol drinking may depend on the level of experientiality. Further, fun-seeking may be maladaptive to alcohol drinking when thinking is experiential, intuitive, fast, and based on situational impressions.

Adults with low rationality are prone to high substance use (Phillips & Vince, 2019) and may benefit from strategies that increase cognitive control. However, in the present study, rationality did not play any role in the effect of psychopathy on alcohol drinking through fun-seeking. A possible explanation lies in the psychopathy construct. Trait psychopathy measured by SD3 contains impulsivity as a critical element (Paulhus & Williams, 2002), and previous findings suggested impulsivity as a possible reason for drinking in subclinical psychopathy (Jauk & Dieterich, 2019). Rationality does not overlap with impulsivity while fun-seeking and experientiality do (Leone & Russo, 2009; Stanovich & Stanovich, 2010). Rationality may be beneficial as a prevention tool (Phillips & Vince, 2019) when traits of psychopathy and fun-seeking disposition are diminished in people who drink alcohol.

4.1 Limitations

We used SD3 (Paulhus & Williams, 2002) to measure psychopathy. The subscale had been used in previous research (Malesza & Kaczmarek, 2021) exploring health-related behavior and alcohol drinking. The emphasis on impulsivity draws the SD3 concept of psychopathy closer to secondary psychopathy than primary psychopathy (Jones & Paulhus, 2014). However, adopting a one-dimensional approach makes it impossible to discern the parts of psychopathy that may drive significant relationships (antagonism/meanness, disinhibition, and boldness/emotional stability). Other tools for measuring secondary psychopathy that are structurally validated could have been used, such as the psychopathic personality inventory (PPI) (Lilienfeld & Andrews, 1996).

We assessed alcohol consumption with a single item derived from the study on dark traits (Malesza & Kaczmarek, 2021), where this item properly detected the general tendency and frequency of alcohol drinking. Other tools, which measure craving, dependency, use disorder, and/or binge drinking, are parts of larger scales that generally measure substance use. Some of them, such as the binge-drinking scale (Cranford et al., 2006), contain one item exclusively for alcohol drinking. We were not interested in exploring general substance use but only the frequency of alcohol drinking. Cognitive features of craving (obsessive thoughts and associations) might also enrich the results.

The study's research design was cross-sectional, so the results could be influenced by personal perceptual bias. It is impossible to generalize the cause-and-effect interpretation. Using the snowball sampling strategy may introduce selection bias and affect sample representativeness. Results are valid only for our research sample.

4.2 Future research implications

Comprehensive models and theories should be considered to explain both, affective and cognitive predictors of alcohol (mis) use (Brand et al., 2021). Future research using homogeneous samples might be valuable in predicting harmful drinking in vulnerable populations (e.g., young adults and employees working in stressful environments). Experimental research could be focused on exploring the intervention effects of decreasing experientiality on behavioral changes and consequences in adults with high levels of psychopathy and fun-seeking. As thinking styles are changeable, longitudinal research exploring differences in low/high levels of experientiality/rationality in a different phase of risky behavior or binge drinking may be enriching.

4.3 Practical implications

The research findings could inform personalized interventions. Focusing on emotion regulation and adaptive coping skills might be especially beneficial for individuals with high experientiality who are at higher risk for the alcohol drinking. It might be worth investigating whether a low experientiality preference acts as a protective factor by reducing alcohol cravings that arise from emotional responses to fun-seeking behaviors.

Rationality did not significantly affect alcohol drinking prediction compared to experientiality, which is related to impulsivity, spontaneity, affection, and emotions. The effective intervention tool to reduce alcohol drinking in people with high psychopathy and fun-seeking may focus on decreasing of the experientiality. Although both processes (rational and experiential) operate sequentially during decision-making, an initial intuitive response may be endorsed, modified, or overridden by subsequent reflective (rational) processing (Kahneman & Frederick, 2002). We suggest that the recognition of being experiential may be crucial in preventing alcohol drinking. Self-regulation in the context of alcohol drinking can be trained through experientiality modification despite the supposed physical core of the BAS activation system (Ventura et al., 2019).

5 CONCLUSIONS

Examining thinking styles together with emotional/motivational and individual correlates offers a new perspective on the psychological mechanism underlying alcohol drinking. Rationality and experientiality shed light on this complex mechanism. Psychopathy predicted alcohol drinking indirectly through fun-seeking. Experientiality may be an important part of the psychological core of adults who tend to seek fun and drink alcohol frequently. Low experientiality may prevent people with high psychopathy and fun-seeking traits from alcohol drinking.

The findings suggest a complex interplay between psychopathy, BAS fun-seeking, alcohol drinking, and reliance on either the rationality or experientiality system for information processing. Psychopathic traits and the BAS fun-seeking likely increase the risk of alcohol drinking, especially for individuals who primarily rely on an intuitive thinking system for managing their emotional responses. Experientiality may be a crucial factor shaping the relationship between psychopathy, fun-seeking behaviors, and alcohol drinking. Low experientiality may be protective factor against the mediating effect of fun-seeking behaviors driving alcohol drinking. Individuals high in experientiality appear most vulnerable to this pathway.

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Data availability: This study's generated/analyzed dataset can be found in the Figshare repository [<https://doi.org/10.6084/m9.figshare.21339063>].

Data transparency statement: The data reported in this manuscript have not been previously published and were not collected as a part of a larger data collection.

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