Examination of the effects of impulsivity and risk-taking propensity on alcohol use in OEF/OIF/OND Veterans

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Abstract

Introduction: A strong association between posttraumatic stress disorder (PTSD) and problematic alcohol use has been demonstrated among Veteran populations exposed to combat trauma. Several traits, such as higher levels of risk-taking propensity (RTP) and impulsivity (e.g., negative urgency [NU]), are associated with both increased PTSD symptom-atology and greater alcohol use problems.

Methods: The present study examined the effects of NU and RTP on alcohol use (measured by average weekly alcohol consumption and number of binge drinking days in 1 month), as well as their potential moderating effects on the association between PTSD symptom severity and alcohol use in a sample of Operation Enduring Freedom/Operation Iraqi Freedom/Operation New Dawn (OEF/OIF/OND) US Veterans. We hypothesized that NU and RTP would both significantly predict alcohol use and moderate the relation between PTSD symptom severity and alcohol use, such that the association between PTSD symptoms and alcohol use would be greater among individuals high compared to low in NU and RTP.

Results: As hypothesized, the main effects of RTP and NU were significantly positively associated with average weekly alcohol consumption and the number of binge drinking days in the past month. However, neither NU nor RTP moderated the relation between PTSD and either alcohol variable.

Discussion: NU and RTP may represent transdiagnostic risk markers for PTSD and alcohol use problems; however, the current study did not support an exploratory role of NU or RTP in the association between PTSD and alcohol use phenotypes.

RÉSUMÉ

On constate une forte association entre le trouble de stress post-traumatique (TSPT) et la consommation problématique d'alcool dans les populations de vétérans exposés au combat. Plusieurs caractéristiques, telles qu'une plus grande propension à prendre des risques (PPR) et l'impulsivité (p. ex., l'urgence négative [UN]), sont liées à la fois à l'augmentation des symptômes de TSPT et à de plus grands problèmes de consommation d'alcool.

La présente étude a évalué les effets de l'UN et de la PPR sur la consommation d'alcool (mesurés d'après la moyenne hebdomadaire de consommation d'alcool et le nombre de journées de beuverie en un mois) de même que leurs effets modérateurs potentiels sur l'association entre la gravité des symptômes de TSPT et la consommation d'alcool dans un échantillon de vétérans américains de l'Opération Liberté immuable, de l'Opération Liberté irakienne et de l'Opération Aube nouvelle. Les chercheurs ont postulé que l'UN et la PPR seraient à la fois d'importants prédicteurs de la consommation d'alcool et un modérateur de la relation entre la gravité des symptômes de TSPT et la consommation d'alcool. Ainsi, l'association entre les symptômes de TSPT et la consommation d'alcool serait plus marquée chez les personnes ayant une UN et une PPR importantes que chez celles qui ayant de légers comportements de ce type.

Comme on l'a postulé, les principaux effets de la PPR et de l'UN avaient une corrélation positive significative avec la consommation hebdomadaire d'alcool et le nombre de journées de beuverie au cours du mois précédent. Cependant, ni l'UN ni la PPR ne modéraient la relation entre le TSPT et ces deux variables liées à l'alcool.

L'UN et la PPR peuvent être des marqueurs de risque transdiagnostiques de TSPT et de problèmes de consommation d'alcool. Cependant, cette étude ne soutenait pas le rôle exploratoire de l'UN ou de la PPR dans l'association entre le TSPT et les phénotypes de consommation d'alcool.

INTRODUCTION

Combat exposure among service members of Operation Enduring Freedom/Operation Iraqi Freedom/Operation New Dawn (OEF/OIF/OND) is prevalent,[1,2] and a recent meta-analysis estimated that upwards of 23% of OEF/OIF/OND Veterans have posttraumatic stress disorder (PTSD).[3] This prevalence is alarmingly high compared to the estimated 8% prevalence of PTSD in the general population.[4,5] Combat exposure has also been linked with

alcohol misuse (e.g., new-onset heavy weekly drinking, binge drinking),[6] and individuals with combat-related PTSD are three times more likely to be diagnosed with a comorbid substance use disorder (SUD), particularly an alcohol use disorder (AUD),[7] when compared to civilian populations.[8] Given that PTSD and problematic alcohol use frequently co-occur in individuals who have experienced combat exposure,[7,9] increased understanding of the factors that moderate the relation between PTSD and alcohol use is crucial for the development and implementation of prevention and intervention strategies.

One factor that may moderate the relation between PTSD and problematic alcohol use is impulsivity, which has been found to be elevated in those with PTSD when compared to both low-level PTSD and healthy controls,[10,11] as well as compared to individuals with anxiety disorders.[10] Impulsivity, defined as a tendency toward loss of control in which an individual is likely to lack patience and engage in hasty, spur of the moment behaviours,[12] is a multifaceted construct.[13] One facet of impulsivity that may be particularly relevant to PTSD is negative urgency (NU),[14,15] the tendency to engage in impulsive behaviours when experiencing negative affect.[14] Impulsivity, NU specifically, has also been linked to alcohol abuse and drinking-related problems in both civilian and military populations,[16–18] yet studies examining these relations within OEF/OIF/OND samples are limited. Hahn and colleagues[19] demonstrated a direct effect of NU on alcohol consumption in a sample of 86 OEF/OIF Veterans, as well as an indirect effect of NU on alcohol consumption as mediated by PTSD. Similarly, Gaher et al.[20] found that NU was indirectly associated with greater alcohol consumption and problems via its positive association with PTSD symptoms. These findings suggest that PTSD serves as a mechanism through which NU contributes to alcohol misuse. However, NU may also influence the relationship between PTSD and alcohol use. Specifically, individuals with PTSD who are high compared to low in NU may be more likely to develop alcohol-related problems, given their propensity to opt for negative reinforcement (e.g., alcohol use) in the context of emotional distress.

Another potential moderator of the relation between PTSD and problematic alcohol use is risk-taking propensity (RTP), defined as the tendency to engage in behaviours that involve some potential for danger or harm while also providing an opportunity to obtain some form of reward.[21] Evidence suggests that RTP is higher among individuals with combat-related PTSD compared to healthy controls.[14] Kilgore and colleagues[22] demonstrated that exposure to combat trauma predicted RTP in a large sample of OIF soldiers. It is plausible that among individuals with PTSD, those with greater RTP exhibit deficient inhibitory control (i.e., have difficulty suppressing reward-driven behaviour) and thus may be more likely to engage in risky behaviours (i.e., problematic drinking). Furthermore, studies have found correlates of risky behaviour in individuals with higher levels of NU, suggesting a linkage between the two constructs in accounting for maladaptive externalizing behaviours.[23] Despite evidence of associations among PTSD, NU, RTP, and problematic alcohol use, studies examining the interplay of these constructs are limited. Furthermore, no studies to our knowledge have examined the moderating effects of either NU or RTP within an OEF/OIF/OND sample.

The present study aimed to examine the relationships among PTSD symptom severity, NU, RTP, and alcohol use (measured by average weekly alcohol consumption and the number of binge drinking days in 1 month) among a sample of OEF/OIF/OND Veterans. Specifically,

we aimed to determine whether NU and RTP significantly predicted alcohol use. Based on the strong associations between NU/RTP with both PTSD and alcohol use demonstrated in the extant literature, it was hypothesized that NU and RTP would have significant main effects on alcohol use, and would significantly moderate the relation between PTSD symptom severity and alcohol use, such that increased levels of NU and RTP would result in a stronger positive association between PTSD symptom severity and alcohol use.

METHODS

Participants

Participants were 302 OEF/OIF/OND Veterans enrolled in a larger ongoing study examining the effect of trauma on stress reactivity and subsequent drinking behaviour (R01 AA020179; PI: Amstadter). Inclusion criteria included an age range of 21–40 years and the ability to provide informed consent. Given that the laboratory session of the parent study involved alcohol consumption, participants had to be regular drinkers and drink beer, but could not meet DSM-IV criteria for current alcohol dependence nor be seeking treatment for alcohol dependence. Exclusion criteria included: history of a moderate or severe traumatic brain injury; the presence of a condition that affects HPA-axis functioning (e.g., Addison's disease), given that the laboratory session involved a stress reactivity test; factors affecting stress or stress hormones (e.g., severe obesity, current major depression); DSM-IV criteria for current alcohol or substance dependence (other than nicotine or caffeine); current treatment-seeking for alcohol dependence; current pregnancy or nursing status (women); and presence of a blood clotting disorder, due to the required blood draw.

Measures

Demographics—A study-specific questionnaire was used to obtain data on participant demographics (e.g., age, gender, race, ethnicity, marital status, education, employment status) and military history (e.g., military branch, rank).

The Life Events Checklist (LEC)[24]—The LEC assesses lifetime trauma load, including a list of 17 potentially traumatic events (e.g., sexual assault, physical assault). Participants indicate whether they have experienced each event, have witnessed the event happening to someone else, or have learned about the event happening to someone close to them. The mean kappa (κ) for all items was moderate ($\kappa = 0.61$), likely due to the diverse nature of the events listed, and the retest correlation was $r = 0.82$, $p < 0.001$.[24]

Clinician-Administered PTSD Scale (CAPS) for DSM-IV[25]—The CAPS is a diagnostic interview for current and lifetime PTSD and was used to assess PTSD symptom liability (i.e., above 0.86) and internal consistency on each of the three PTSD symptom clusters (range: 0.63 to 0.89), and correlates strongly (i.e., above 0.61) with other measures of PTSD.[26,27]

Timeline Followback (TLFB)[28]—The TLFB collects data regarding the quantity and frequency of drinking during the prior 30 days. The TLFB has been psychometrically validated, and it is used extensively to derive primary drinking behaviour. It demonstrates

test-retest reliability correlations above 0.85.[29] We calculated both average weekly alcohol consumption and the total number of binge drinking days within the past month from the TLFB. Binge drinking was defined by National Institute on Alcohol Abuse and Alcoholism (NIAAA) standards as the number of days in which individuals consumed 5 drinks or more (for males) and 4 drinks or more (for females) within the same drinking episode.

UPPS Impulsive Behavior scale[30]—We used the negative urgency (NU) sub-scale from the UPPS. The NU sub-scale consists of 12 items (e.g., "I have trouble controlling my impulses"), and had strong internal consistency (Cronbach's $a = 0.90$).

The Balloon Analogue Risk Task (BART)[21]—The Balloon Analogue Risk Task (BART) is a computerized, laboratory-based measure of risk-taking behaviour for which – similar to real-world situations – riskiness is rewarded to the point at which further risk-taking results in poorer outcomes. Specifically, the task is presented on a computer screen that includes a small simulated balloon accompanied by a balloon pump, a reset button labelled "Collect $$,$" a permanent money earned display labelled "Total Earned," a second display listing the money earned on the last balloon and labelled "Last Balloon," and a third display presenting the current balloon's reward/loss magnitude, labelled "$ per pump." Each click on the pump inflates the balloon one degree (about 0.125" in all directions). With each pump, 5 cents accrues. When a balloon is pumped past its individual explosion point, a "pop" sound is generated by the computer. When a balloon explodes, all money in the temporary bank is lost, and the next uninflated balloon appears on the screen. At any point during each balloon trial, the participant can stop pumping the balloon and click the "Collect $$$" button. Clicking this button transfers all money from the temporary bank to the permanent bank, and the new total earned is incrementally updated cent by cent while a slot machine payoff sound plays. After each balloon explosion or money collection, the participant's exposure to that balloon ends and a new balloon appears, until a total of 30 balloons (i.e., trials) have been completed. The "adjusted average pumps," which is the average number of pumps excluding balloons that exploded (i.e., the average number of pumps on each balloon prior to money collection), was used to measure risk-taking propensity. Notably, participants' performance on the BART did not affect their actual compensation for participation in the study, which they were told before beginning the task. Risky behaviour on the BART (adjusted average pumps) showed acceptable test-retest reliability across days ($r = 0.77$, $p < 0.001$).[31]

Procedure

Participants were recruited through the community, as well as the university and Veteran's hospitals, by advertising (e.g., flyers, Internet), and through collaborations with other researchers. We distributed mailings via the local Veterans hospital. Potential participants were screened via telephone or REDCap, a secure web-based application designed exclusively to support data capture for research studies.[32] Individuals meeting basic eligibility criteria completed an office visit assessment, and those meeting final eligibility criteria completed a second lab visit; however, only data from the initial office visit are presented here. The office visit included the provision of informed consent, a clinical interview, a battery of self-report measures, and computerized testing for RTP. The Virginia

Commonwealth University and McGuire VA Institutional Review Boards approved all study procedures.

Data analytic plan

We assessed all variables prior to analyses for univariate normality. Variables with violations in skewness or kurtosis were log-transformed (i.e., average weekly alcohol consumption, binge drinking). To examine the moderating effects of NU and RTP on the relationship between PTSD and alcohol use, we conducted four separate hierarchical linear regression analyses each for NU and RTP: two predicting average weekly alcohol consumption, and two predicting the number of binge drinking days in the past month. Categorical demographic variables were dummy coded. In step 1 for each of the respective models, we included the demographic variables significantly associated with each outcome variable in the correlation analysis; in step 2, we controlled for lifetime exposure to trauma. Gender, ethnicity (Hispanic vs. White/non-Hispanic), and smoking status (present or past smoker vs. non-smoker) were controlled for in the first step of both models predicting average weekly alcohol use. Age, ethnicity, marital status (married or cohabitating vs. single, divorced, widowed), and employment status (employed full- or part-time vs. student, unemployed, on disability, etc.), and smoking status were included in the first step of both models predicting number of binge drinking days in the past month. Prior to the analyses, the independent and moderator variables were centred, and a product term was created from the centred variables.[33] PTSD symptom severity was entered in step 3, the additive effect of either NU or RTP was entered in step 4, and the interaction term was entered in the step 5 of the model.

RESULTS

Descriptive statistics are shown in Table 1. Correlations are shown in Table 2. Notably, RTP and NU were not significantly correlated.

PTSD symptom severity was significantly positively associated with average weekly alcohol use after con trolling for ethnicity and lifetime trauma load. However, PTSD symptom severity was not significantly associated with the number of binge drinking days in the past month after controlling for relevant demographics (i.e., age, ethnicity, marital status, employment status, smoking status) and lifetime trauma load. After controlling for gender, ethnicity, smoking status, lifetime trauma load, and PTSD symptom severity, NU was significantly positively associated with average weekly alcohol consumption. Similarly, after controlling for associated demographic factors (i.e., age, ethnicity, marital status, employment status, smoking status), lifetime trauma load, and PTSD symptom severity, there was a significant main effect of NU on the number of binge drinking days in the past month. However, the interaction of NU and PTSD symptom severity on the average weekly alcohol consumption and the number of binge drinking days was not significant (see Table 3 and Table 4).

After controlling for gender, ethnicity, smoking status, lifetime trauma load, and PTSD symptom severity, RTP was significantly positively associated with average weekly alcohol consumption. However, RTP was not significantly associated with the number of binge drinking days in the present sample. Moreover, as with NU, the interaction of RTP and

PTSD symptom severity was not significant with respect to either average weekly alcohol consumption or the number of binge drinking days.

DISCUSSION

The present study aimed to examine the effects of NU and RTP on alcohol use in a sample of OEF/OIF/OND Veterans, as well as to explore the moderating influences of NU and RTP on the relation between PTSD symptom severity and alcohol use. Findings from the present study demonstrated significant main effects of NU (both average weekly consumption and number of binge drinking day in the past month) and RTP (average weekly consumption only) on alcohol use, even after controlling for relevant demographic variables, lifetime trauma load, and PTSD symptom severity. These findings are in line with evidence suggesting that both greater propensity for risk and higher levels of NU are associated with greater alcohol use problems,[14,16,19,34] and contribute to the sparse literature available examining the effects of NU and RTP on alcohol use among OEF/OIF/OND Veterans specifically. However, contrary to our predictions, neither NU nor RTP moderated the relation between PTSD and alcohol use. The association between PTSD and alcohol consumption does not appear to be modified by these personality characteristics in this Veteran sample.

The lack of correlation between NU and RTP in the current study suggests that these constructs may represent independent risk markers for behavioural dysfunction following exposure to combat. This finding is somewhat contradictory to previous research which has found correlates of risky behaviour in individuals with higher levels of NU.[23] However, other work has supported unique associations between related personality domains and externalizing dysfunction as a function of separate, yet similarly related constructs (e.g., urgency and sensation seeking).[35] Additionally, RTP was assessed using behavioural performance tasks while NU was measured through self-report questionnaires. Prior research has documented small correlations between behavioural and self-report measures (e.g.,[36]), making the reliability of the responses for each assessment in congruence with one another unclear.[37]

Several limitations of the current study could explain our lack of significant findings regard to moderation above and beyond a true absence of moderating effect. First, because alcohol was provided in the parent study, individuals were excluded based on alcohol dependence and abuse for ethical reasons. Thus, the present analyses do not capture individuals who have severe alcohol use or who meet criteria for AUD and, therefore, findings are not generalizable to individuals with more severe alcohol problems. This could also potentially explain the lack of significant findings with regard to moderation. A future direction of this research would be to evaluate NU and RTP in the context of the relation of PTSD and more pathological forms of alcohol use (i.e., AUD), as well as other alcohol phenotypes (e.g., drinking-to-cope motives, alcohol use problems/consequences). Second, because the current sample consisted primarily of males (88.5%), gender differences were not examined. Considering disparate rates of PTSD among men and women,[4,5,38] future studies should account for gender differences when investigating the potential influence of aspects of impulsivity and RTP on the relationship between PTSD and alcohol. Third, the study did not

evaluate other, related dimensions of impulsivity (e.g., positive urgency). Therefore, the specificity of the findings to impulsivity and RTP specifically is not clear. Fourth, the data were cross-sectional, precluding a test of direction of effect and the examination of NU and RTP as potential mediators of the relation between PTSD and alcohol. Future studies should test the mediational effects of NU and RTP within a longitudinal framework, as such research would ultimately decrease bias that accompanies cross-sectional approaches to mediation (Maxwell and Cole, 2007) and increase understanding of NU, RTP, PTSD, and alcohol use. Finally, the use of a self-report questionnaire to assess NU (e.g., UPPS) introduces the potential of reporting bias. Conversely, collection of data via a behavioural task (BART) and semi-structured clinical interviews (CAPS) are notable strengths of the study.

The present study fills a gap in the literature by examining associations between NU and RTP in relation to comorbid PTSD and alcohol use within a combat-exposed Veteran sample. Although NU and RTP were not found to moderate the relation between PTSD and alcohol misuse, findings did suggest that NU and RTP are each risk factors for increased alcohol consumption among Veterans, above and beyond the effects of PTSD. These findings highlight the utility of screening for high NU and RTP in addition to PTSD among Veterans returning from deployment. Identifying individuals with high NU and propensity for risk-taking immediately following deployment has the potential to inform intervention and prevention methods prior to alcohol misuse initiation, when Veterans are adapting to post-deployment life. Understanding of these relationships is particularly crucial within populations that are already at higher risk for risky alcohol behaviour (e.g., combat Veterans). Therefore, future research in Veteran samples is needed to determine the clinical utility of screening for NU and RTP in combat trauma populations.

FUNDING

AUTHOR INFORMATION

Sage E. Hawn, MS, is a doctoral candidate at Virginia Commonwealth University. Her research interests lie at the intersection of biological (e.g., genetic, neuroendocrine) and psychosocial factors that influence posttraumatic stress disorder (PTSD) and other trauma-related pathologies (e.g., substance use disorder).

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Table 1.

*N*s, Ranges, Means, Standard Deviations, and Proportions of study constructs

Variable	*N*	Range	Mean	SD
Age	295	22–40	30.54	4.49
PTSD severity [*]	296	0–108	28.47	23.81
Trauma load	292	0–19	7.56	4.00
Average weekly alcohol	299	0–54.49	9.21	9.17
Binge drinking	302	0–29	2.56	4.00
RTP				
(BART adjusted average pumps)	288	0.90–71.38	30.67	14.17
NU				
(UPPS NU sub-scale average)	284	1–3.83	2.12	0.60
			(%)	
Gender	302			
Male			88.5	
Race	302			
White			67.6	
Black			23.4	
Other			9.0	
Ethnicity	302			
Non-Hispanic			91.9	
Marital Status	302			
Never married			42.1	
Separated/divorced			17.2	
Currently married or cohabitating			40.3	
Widowed			0.4	
Education	302			
High school			7.9	
Some college			51.4	
College			30.0	
More than college			10.7	

Variable	N	Range	Mean	SD
Employment status	302			
Employed			72.4	
Unemployed			27.6	
Smoker status				
Never			41.1	
Past, but not now			34.1	
Current			24.8	
Military branch	290			
Army			54.8	
Marine Corps			20.7	
Navy			10.3	
Air Force			3.5	
Army National Guard			6.2	
Reserves/other			4.5	
Military rank	302			
E-1 to E-7			90.0	
O-1 to O-4			10.0	

*
n = 99 (32.8%) met full DSM-IV diagnostic criteria for PTSD.

PTSD = posttraumatic stress disorder; RTP = risk-taking propensity; BART = Balloon Analogue Risk Task; NU = negative urgency; UPPS = UPPS Impulsive Behavior Scale.

Table 2.

Correlation coefficients for pairs of variables

		1	2	3	4	5	6	7	8	9	10	11	12	13
1.	PTSD severity	1	-	-	-	-	-	-	-	-	-	-	-	-
2.	Weekly drinking	.166†	1	-	-	-	-	-	-	-	-	-	-	-
3.	Binge drinking	.120*	.788‡	1	-	-	-	-	-	-	-	-	-	-
4.	NU	.326‡	.172†	.211‡	1	-	-	-	-	-	-	-	-	-
5.	RTP	-.087	.142*	.100	.026	1	-	-	-	-	-	-	-	-
6.	Trauma exposure	.254‡	-.041	-.012	.200†	-.059	1	-	-	-	-	-	-	-
7.	Age	-.026	-.081	-.182†	.096	-.105	.092	1	-	-	-	-	-	-
8.	Ethnicity	.032	.115*	.120*	-.031	-.160†	-.009	.018	1	-	-	-	-	-
9.	Race	.027	.096	.106	.030	.112	-.042	-.160†	-.088	1	-	-	-	-
10.	Employment status	-.053	-.076	-.157†	-.085	.068	.042	.217‡	-.027	.018	1	-	-	-
11.	Marital status	-.085	-.106	-.173†	.036	-.085	-.087	.238‡	.012	.086	.146*	1	-	-
12.	Gender	.022	-.117*	-.034	.091	.024	.029	-.032	.021	-.089	-.111	-.047	1	-
13.	Smoking status	.091	-.171†	-.154†	.152*	.011	.107	-.062	.027	.006	.018	-.057	-.088	1

PTSD = posttraumatic stress disorder; NU = negative urgency; RTP = risk-taking propensity.

*
$p < 0.05$.

†
$p < 0.01$.

‡
$p < 0.001$.

Table 3.

Summary of moderating effects of NU and RTP on relationship between PTSD and average weekly alcohol use

		Average weekly alcohol use								
	NU					**RTP**				
Variable	β	t	P	R²	**Variable**	β	t	P	R²
Step 1					**Step 1**				
Gender	−.092	−1.538	.125	.060 †	Gender	−.112	−1.873	.062	.068 ‡
Ethnicity	−.134	−2.238	.026		Ethnicity	−.120	−2.006	.042	
Smoking status	.174	2.902	.004		Smoking status	.191	3.184	.002	
Step 2					**Step 2**				
Gender	−.090	−1.496	.136	.005	Gender	−.109	−1.821	.070	.005
Ethnicity	−.136	−2.278	.024		Ethnicity	−.121	−2.032	.043	
Smoking status	.182	3.026	.003		Smoking status	.199	3.307	.001	
Lifetime trauma	−.074	−1.226	.221		Lifetime trauma	−.073	−1.225	.222	
Step 3					**Step 3**				
Gender	−.092	−1.564	.119	.034 †	Gender	−.118	−1.993	.047	.035 †
Ethnicity	−.139	−2.377	.018		Ethnicity	−.119	−2.027	.044	
Smoking status	.164	2.749	.006		Smoking status	.182	3.057	.002	
Lifetime trauma	−.117	−1.929	.055		Lifetime trauma	−.119	−1.965	.050	
PTSD severity	.191	3.153	.002		PTSD severity	.195	3.215	.001	
Step 4					**Step 4**				
Gender	−.104	−1.760	.080	.014 *	Gender	−.121	−2.066	.040	.017 *
Ethnicity	−.136	−2.332	.020		Ethnicity	−.100	−1.699	.090	
Smoking status	.148	2.472	.014		Smoking status	.178	3.008	.003	
Lifetime trauma	−.132	−2.167	.031		Lifetime trauma	−.113	−1.876	.062	
PTSD severity	.157	2.506	.013		PTSD severity	.204	3.382	.001	
NU	.125	1.996	.047		RTP	.131	2.227	.027	
Step 5					**Step 5**				
Gender	−.104	−1.758	.080	.000	Gender	−.121	−2.072	.039	.003
Ethnicity	−.136	−2.316	.021		Ethnicity	−.100	−1.706	.089	

Average weekly alcohol use

Variable	NU				Variable	RTP			
	β	t	P	R²		β	t	P	R²
Smoking status	.149	2.486	.014		Smoking status	.184	3.092	.002
Lifetime trauma	−.131	−2.152	.032		Lifetime trauma	−.117	−1.932	.054
PTSD severity	.153	2.398	.017		PTSD severity	.198	3.265	.001
NU	.124	1.965	.050		RTP	.130	2.197	.029
NU*PTSD severity	.018	.307	.759		RTP*PTSD severity	−.056	−.953	.341

NU = negative urgency; RTP = risk-taking propensity; PTSD = posttraumatic stress disorder.

*
p < 0.05.

†
p < 0.01.

‡
p < 0.001.

Table 4.

Summary of moderating effects of NU and RTP on relationship between PTSD and binge drinking

		Number of binge drinking days in the past month						RTP			
	NU						RTP				
Variable	β	t	P	R²	Variable	β	t	P	R²
Step 1					**Step 1**				
Age	−.111	−1.810	.071	.103‡	Age	−.125	−2.042	.042	.110‡
Ethnicity	−.139	−2.385	.018		Ethnicity	−.137	−2.347	.020	
Marital status	−.119	−1.979	.049		Marital status	−.129	−2.144	.033	
Employment status	−.140	−2.319	.021		Employment status	−.130	−2.155	.032	
Smoking status	.145	2.466	.014		Smoking status	.152	2.596	.010	
Step 2					**Step 2**				
Age	−.108	−1.755	.080	.000	Age	−.125	−2.011	.045	.000
Ethnicity	−.140	−2.390	.018		Ethnicity	−.138	−2.344	.020	
Marital status	−.121	−2.001	.046		Marital status	−.130	−2.142	.033	
Employment status	−.139	−2.309	.022		Employment status	−.130	−2.143	.033	
Smoking status	.147	2.484	.014		Smoking status	.153	2.589	.010	
Lifetime trauma	−.020	−.339	.735		Lifetime trauma	−.008	−.128	.899	
Step 3					**Step 3**				
Age	−.103	−1.675	.095	.012	Age	−.117	−1.898	.059	.014*
Ethnicity	−.142	−2.429	.016		Ethnicity	−.136	−2.327	.021	
Marital status	−.116	−1.913	.057		Marital status	−.124	−2.057	.041	
Employment status	−.131	−2.177	.030		Employment status	−.123	−2.037	.043	
Smoking status	.137	2.325	.021		Smoking status	.143	2.428	.016	
Lifetime trauma	−.049	−.797	.426		Lifetime trauma	−.037	−.606	.545	
PTSD severity	.116	1.905	.058		PTSD severity	.121	1.999	.047	
Step 4					**Step 4**				
Age	−.128	−2.091	.038	.027†	Age	−.112	−1.803	.073	.004
Ethnicity	−.137	−2.385	.018		Ethnicity	−.127	−2.155	.032	
Marital status	−.117	−1.959	.051		Marital status	−.120	−2.978	.049	

Number of binge drinking days in the past month

	NU					RTP			
Variable	**β**	**t**	**P**	**R²**	**Variable**	**β**	**t**	**P**	**R²**
Employment status	-.114	-1.905	.058		Employment status	-.127	-2.110	.036	
Smoking status	.115	1.957	.051		Smoking status	.142	2.407	.017	
Lifetime trauma	-.070	-1.146	.253		Lifetime trauma	-.034	-.560	.579	
PTSD severity	.064	1.028	.305		PTSD severity	.126	2.069	.040	
NU	.180	2.878	.004		RTP	.062	1.032	.303	
Step 5				.000	**Step 5**				.002
Age	-.126	-2.039	.042		Age	-.111	-1.789	.075	
Ethnicity	-.138	-2.392	.017		Ethnicity	-.127	-2.158	.032	
Marital status	-.116	-1.936	.054		Marital status	-.121	-1.995	.047	
Employment status	-.116	-1.927	.055		Employment status	-.125	-2.058	.041	
Smoking status	.113	1.911	.057		Smoking status	.147	2.477	.014	
Lifetime trauma	-.070	-1.150	.251		Lifetime trauma	-.038	-.615	.539	
PTSD severity	.069	1.076	.283		PTSD severity	.121	1.978	.049	
NU	.182	2.889	.004		RTP	.060	1.004	.316	
NU*PTSD severity	-.021	-.344	.731		RTP*PTSD severity	-.047	-.801	.424	

NU = negative urgency; RTP = risk-taking propensity; PTSD = posttraumatic stress disorder.

*
$p < 0.05$.

†
$p < 0.01$.

‡
$p < 0.001$.