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DOSE-RESPONSE RELATIONSHIP OF ALCOHOL AND INJURY CAUSE: EFFECTS OF COUNTRY-LEVEL DRINKING PATTERN AND ALCOHOL POLICY

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Abstract

Background: The dose-response relationship of alcohol and injury and the effects of country-level detrimental drinking pattern (DDP) and alcohol control policy on this relationship is examined for specific causes of injury.

Method: The dose-response risk of injury is analyzed on 18,627 injured patients in 22 countries included in the International Collaborative Alcohol and Injury Study (ICAIS), using case-crossover analysis by cause of injury (traffic, violence, falls, other), DDP and the International Alcohol Policy and Injury Index (IAPII).

Results: Risk of all injury was higher at all volume levels in higher DDP countries compared to lower DDP countries and for each cause of injury. Risk of injury from traffic was significantly greater in higher DDP than lower DDP countries at 3.1–6 drinks (OR=2.65, CI=1.17–5.97), and at 3 drinks for falls (OR=2.51, CI=1.52–4.16) and injuries from other causes (OR=1.72, CI=1.10–2.69). Countries with higher restrictive alcohol policy were at a lower risk of injury at lower levels of consumption (< 3 drinks) for all injuries (OR= 0.72, CI=0.56–0.92) and for injuries from other causes (OR=0.46, CI=0.29–0.73), and at a lower risk of traffic injuries at higher levels of consumption (> 10 drinks). At higher levels of consumption (> 10 drinks) countries with higher

alcohol policy restrictiveness were at greater risk for all injuries (OR=2.03, CI=1.29–3.20) and those from violence (OR=9.02, CI=3.00–27.13) and falls (OR=4.29, CI=1.86–9.91)

Conclusions: Countries with high DDP are at higher risk of injury from most causes at a given level of consumption, while countries with low restrictiveness of alcohol policy are at higher risk of injury at lower levels of consumption and at higher risk of traffic injuries at high levels of consumption. These findings underscore the importance of aggregate-level factors which need to be considered in developing effective intervention and prevention strategies for reducing alcohol-related injury. Dose-response, relative risk, cause of injury, policy

INTRODUCTION

An elevated risk of injury from alcohol consumption is well established, based on studies conducted in emergency departments (EDs) using probability samples of patients (Gmel et al., 2006; Gmel et al., 2009). A systematic review of such studies of patient's self-reported drinking prior to injury found odds ratios (ORs) ranging from 1.98 to 4.23 (Zeisser et al., 2013) depending on study design. A dose-response relationship has also been found between drinking and risk of injury (McLeod et al., 1999; Watt et al., 2004), with ORs of 3.3, 3.9, 6.5 and 10.1 for 1, 2–3, 4–5 and 6 or more drinks, respectively, consumed prior to injury (Borges et al., 2006). Another study across 18 countries found risk of injury doubled after one drink and peaked at about 30 drinks prior to injury (Cherpitel et al., 2015). Risk of injury from drinking prior to the event has been found to vary by cause of injury, with risk higher for injuries related to violence than for those related to traffic, falls or other causes (Kuendig et al., 2008; Macdonald et al., 2006). Violence-related injuries have also been found to show a steeper dose-response relationship with drinking than those from non-intentional causes (Borges et al., 2004; Vinson et al., 2003).

Detrimental drinking pattern (Rehm et al., 2001) and alcohol policy in a country have been found to be important predictors of alcohol-related injury. At the same time, they have not been examined in relation to the dose-response relationship of drinking and injury. A meta-analysis of ED data in six countries found the rate of alcohol-related injury (defined as drinking within six hours prior to the event) was greater in those countries with higher levels of DDP (Cherpitel et al., 2004), while multilevel analyses of ED data in 16 countries found DDP to predict rates of alcohol-related injury, controlling for individual and study level volume (Cherpitel et al., 2005). Similar analysis in 19 countries also found DDP was predictive of patients' reporting a causal attribution of their injury to drinking, and this study found policies related to drinking and driving and alcohol access were predictive of causal attribution as well (Cherpitel et al., 2012). Additional analysis across 28 countries did not find DDP a significant predictor of either reporting drinking prior to injury or causal attribution, when the International Alcohol Policy and Injury Index (IAPII) (Korcha et al., 2018) was included in the model (Cherpitel et al., 2018a).

Extending this analysis by cause of injury, DDP was found to be a significant predictor of alcohol-related injuries from traffic and violence, but lost significance for traffic-related injuries when the IAPII was included in the models, while the IAPII was a significant predictor only for traffic injury (Cherpitel et al., 2018b).

Taken together, these data suggest, in addition to individual-level drinking variables, societal-level variables play an independent role in rates of alcohol-related injury and this may vary by cause of injury. To obtain a more comprehensive understanding of alcohol and injury, it seems imperative that these aggregate-level factors are also considered in risk of injury. Reported here is the dose-response risk relationship of alcohol and injury and the effects of two aggregate-level variables (country-level drinking pattern and alcohol control policy) on this relationship for specific causes of injury. We hypothesize that a dose-response relationship will be observed for each cause of injury, and at all levels of the aggregate variables, but magnitude of the relationship will vary across levels of the aggregate variables, with a greater risk of injury in countries with higher DDP and less restrictive alcohol control policies at each dose-response level. These data are important for informing intervention and prevention strategies aimed at reducing specific causes of alcohol-related injury.

METHODS

Samples

Individual-level data are analyzed from 18,627 injury patients treated between 2000 and 2016 in 51 EDs in 22 countries included in the International Collaborative Alcohol and Injury Study (ICAIS) (Cherpitel et al., 2018a), which is comprised of ED data on alcohol and injury from four international collaborative research projects, all using the same instrumentation and protocols (Cherpitel, 1989): the Emergency Room Collaborative Alcohol Analysis Project (ERCAAP), and three other international collaborative studies conducted by the World Health Organization (WHO), the Pan American Health Organization (PAHO) and the National Institute on Alcohol Abuse and Alcoholism (NIAAA) (see Table 1).

Probability samples of patients 18 years and older arriving within six hours of the injury event were obtained, based on consecutive arrival to each ED, including those arriving by ambulance. The age of 18 was used to maintain commonality across studies and because obtaining parental consent for those under age 18 could have biased patient responses. Samples were selected to provide an equal representation of each shift for each day of the week during the study period, ensuring generalizability of the sample to the patient population of those injured in the respective ED during the study period. Following informed consent provided by the patient, trained interviewers administered a structured instrument of about 25 minutes in length that included questions about the injury bringing them to the ED, drinking within six hours prior to the injury event, and drinking during the same six-hour period the previous week. Completion rates averaged 87% across the studies. Reasons for non-interviews were primarily due to refusing, but also included incapacitation, leaving prior to completing the interview, being in police custody and language barriers. Patients who were too severely injured to be approached in the ED were followed into the hospital and interviewed once their condition had stabilized.

Individual-level measures

Cause of injury—Patients were asked about the cause of injury with response options including: being in a vehicle collision (driver, passenger, or pedestrian hit by a vehicle)

(Traffic), a fall or trip (Fall), blunt force injury, stab/cut/bite, gunshot, choking/hanging, stuck against/caught between, drowning, poisoning, burn and others (Others). Patients were also asked whether they got into a fight, were beaten, attacked or raped (Violence). Cause of injury was categorized as traffic, violence, falls, other (including all injuries not belonging to the three causes). Note that an injured patient can report both violence and traffic injuries or violence and fall injuries, though the numbers are small (103 and 52, respectively). Injury categories were not mutually exclusive as data were not obtained on the primary cause of injury.

Drinking prior to injury and the control period—Patients were asked about the beverage-specific number, size and alcohol concentrations of drinks they consumed, including locally produced beverages, during the six hours prior to injury and during the same six-hour period the previous week. The total volume for each time period, separately, was obtained by summing across all beverage types and converting to the number of standard drinks, each containing 16 ml (12.8 grams) of pure ethanol. Volume for each time period was then categorized into four levels (< 3 drinks, 3.1–6 drinks, 6.1–10 drinks >10 drinks).

Aggregate-level measures

Detrimental drinking pattern (DDP)—DDP is an indicator of the “detrimental impact” on health and other drinking-related harms at a given level of alcohol consumption and was derived from country-level survey and key informant data across 51 countries, based on indicators of alcohol’s integration in society (e.g., drinking in public places, drinking to intoxication, drinking with meals) (Rehm et al., 2001; Rehm et al., 2003). DDP scores range from 1 (the least detrimental pattern of drinking) to 4 (the most detrimental). In analysis here, DDP was categorized as low (DDP of 1 or 2) and high (DDP of 3 or 4).

Alcohol control policy—The International Alcohol Policy and Injury Index (IAPII) was used as the alcohol policy measure and includes four regulatory domains: *physical availability* (legal minimum drinking age, government monopoly of retail sales, restrictions on outlet density, restrictions on outlet hours and days of operation); *vehicular* (random breath testing, legal blood alcohol concentration (BAC) limits, penalties for exceeding the maximum BAC); *advertising/promotion* (a composite measure of restrictions on the majority of media advertisements); *drinking context* (community mobilization programs, mandatory server training). It was specifically developed to predict injury on an international basis (Korcha et al., 2018), and was found to predict variation in rates of alcohol-related injury among ED patients in 28 countries (Cherpitel et al., 2018a). The IAPII generates a score ranging from 1 (least restrictive) to 100 (most restrictive) which is item weighted by effectiveness, stringency and per capita gross national income (GNI). The alcohol policy data were extracted from the WHO 2012 Global Information System on Alcohol and Health (GISAH). For each country the 2012 policy data were sent to a key informant in the country (generally the country principal investigator of the ED study) to verify whether the data adequately reflected the policies in place at the time and location of the ED study. If not, the GISAH data were modified to do so. For analysis here the IAPII was categorized as low (0–65) and high (66–100) based on a similar number of studies in each category.

Data analysis

Case-crossover analysis was used to analyze risk of injury in which patients' alcohol consumption within six hours prior to injury is compared to their own alcohol consumption during the same time period the previous week (Maclure, 1991; Mittleman et al., 1993). The case-crossover design, in which each individual acts as his or her own control, is considered one type of matched case-control design. Conditional logistic regression was used to estimate ORs and 95% CIs for risk of injury from drinking, separately for each cause of injury for each of four levels of alcohol consumption in the six hours prior to injury. Given sparse data at high consumption levels which may be subject to recall bias, all volume levels >10 drinks were included in the >10 drinks as the upper category. ORs and CIs are also reported, separately by cause of injury, and for each cause by DDP and alcohol control policy. Interaction terms for each are also examined.

RESULTS

Table 1 describes the 22 countries included in the analysis, cause of injury, DDP and the IAPII.

Table 2 shows the ORs and 95% CIs for each of the four levels of alcohol consumption prior to the event for each cause of injury. Risk of injury was significantly elevated at each level of consumption for each cause of injury and a dose-response relationship was observed for each cause of injury with the exception of injury from other causes at the highest level of > 10 drinks prior to injury.

Table 3 shows risk of an alcohol-related injury by the amount consumed at lower (1 or 2) and higher (3 or 4) levels of DDP, and the interaction of DDP by volume for each injury cause. A dose-response relationship was observed across all injuries at both lower and higher DDP levels, and for each cause. Risk of all injury was higher at all volume levels in higher DDP countries compared to lower DDP countries, and for each cause of injury, with the exception of violence where risk at volumes > 6 drinks was greater for lower compared to higher DDP countries, and over twice as high at > 10 drinks (OR=48.03, CI = 16.31–141.46 vs. OR=21.51, CI = 12.54–36.91), although the interaction of volume by DDP was not significant. Risk of all injury was significantly greater in higher DDP countries for volume levels 2 drinks (OR=1.70, CI=1.32–2.21), 3.1–6 drinks (OR=1.55, CI=1.10–2.19) and >10 drinks (OR=1.88, CI=1.77–3.03) prior to injury. Risk of traffic injury was significantly greater in higher DDP than lower DDP countries at 3.1–6 drinks (OR=2.64, CI=1.17–5.97), and at 3 drinks for falls (OR=2.51, CI=1.52–4.16) and injuries from other causes (OR=1.72, CI=1.10–2.69).

Table 4 shows risk of injury by drinking volume and levels of the IAPII. Risk for all injuries generally followed a dose-response relationship at both levels of restrictiveness of alcohol policy. Countries with high restrictive alcohol policy were at a lower risk of injury at lower levels of consumption (< 6 drinks), but not at higher levels of consumption where risk was twice as high at > 10 drinks for high restrictive countries (OR=14.93, CI=10.82–20.60) compared to low restrictive countries (OR=7.36, CI=5.33–10.15). The volume by IAPII interaction was significant for those consuming 3 drinks (OR=0.72, CI=0.56–0.92) and at >

10 drinks (OR=2.03, CI=1.29–3.20). A dose-response relationship was generally found for most causes of injury at both IAPII levels but was stronger for the high restrictive countries. The volume by IAPII interaction was significant at > 10 drinks for violence (OR=9.02, CI=3.00–27.13) and falls (OR=4.29, CI=1.86–9.91), where high restrictive countries were at greater risk. In contrast, high restrictive countries were at lower risk at > 10 drinks (OR=0.17, CI=0.04–0.74) for traffic injuries and at 3 drinks (OR=0.46, CI=0.29–0.73) for injuries from other causes compared to low restrictive countries.

DISCUSSION

A dose-response relationship of alcohol volume prior to injury and risk of injury was observed for all cause of injury combined, but this relationship was not observed for some causes of injury nor across different levels of the aggregate variables analyzed. We hypothesized that a greater risk for each cause of injury would be found in regions with higher DDP and where fewer alcohol control policies were implemented.

A dose-response relationship was observed for all injuries at both lower and higher DDP levels. Risk appeared greater at higher levels of DDP than at lower levels for each cause of injury except for violence at higher volume levels (although the interaction was not significant). Previous research has found lower rates of violence in lower DDP countries compared to higher DDP countries, but higher rates of alcohol-related violence (Cherpitel et al., 2018c). These data suggest that countries with higher detrimental drinking patterns are at a greater risk of an injury at a given level of consumption as hypothesized.

Risk for all injuries followed a dose-response relationship at both the low and high level of the IAPII, and countries with low restrictive alcohol policy were at higher risk of injury at lower levels of consumption. However, at higher levels of consumption less restrictive countries were at a lower risk of injury than more restrictive countries, and this was true for all causes except traffic injuries. It is possible that individuals living in countries with more restrictive alcohol policies have less opportunity to drink at higher levels and consequently have less tolerance to alcohol resulting in a greater risk of injury. Contrary to our hypothesis, these data suggest that although countries with lower restrictive alcohol policy are at higher risk of injury at low levels of consumption, they appear to be at a lower risk of injury at higher levels of consumption compared to countries with more restrictive alcohol control policies; this with the exception of traffic injuries, where low restrictive countries were found to be at a significantly higher risk than high restrictive countries at >10 drinks. One of the four domains of the IAPII is vehicular policy and these policies (random breath testing, legal and lower BAC limits while driving and associated penalties) are most likely to be in place and enforced in more developed countries (Bloom et al., 2011). As seen in Table 1, countries with high restrictive policy are those most highly developed, and may be tied to the fact that the IAPII was weighted by the country GNI (Korcha et al., 2018)

Limitations

Some limitations to this study apply. The dose-response risk relationship was based on patient self-report of drinking in the six hours prior to injury compared to their self-reported drinking during the same six- hour period the previous week. While self-reports of drinking

in the six hours prior to injury have been found to be valid based on breathalyzer readings obtained at the same time (Cherpitel et al., 1992), some recall bias may be present for reports of drinking up to a week prior to the injury event (Cherpitel et al., 2018d). Both under-reporting and over-reporting of drinking in the event may also have occurred, with under-reporting likely among drivers involved in a motor vehicle crash, while over-reporting may occur as an excuse factor for those injured in violence-related events. Additionally, while the case-crossover design controls for individual stable risk factors that would not likely vary between the case and control periods, it does not take into account other potentially important conditions such as other drug use, stress or significant life events that may have influenced risk of injury, and these data were not collected for either time period.

While alcohol policy variables were collected to reflect the same time-period during which the respective ED data were collected, and key informants in each country verified that items comprising the policy index were accurate for the time-period during which the ED data were collected in their country, policy items may not adequately represent the geographic area relevant to the specific ED study.

While all studies used a similar design and instrumentation, and all with uniform, rigor, drawing patient samples to be representative of the respective ED, ED patient samples cannot be considered to be representative of a broader area than that served by the ED.

Given these limitations, data here suggest that countries with high detrimental drinking patterns are at higher risk of an injury from most causes at a given level of consumption compared to countries with low detrimental drinking patterns, while the restrictiveness of alcohol control policy and risk of injury varies by volume and cause of injury. Countries with lower restrictiveness of alcohol policies are at higher risk of injury at low levels of consumption and for traffic injuries at high volume levels compared to countries with higher policy restrictiveness. These findings underscore the importance of aggregate-level factors in addition to individual-level factors such as quantity and frequency of drinking, on risk of injury, and both levels of factors need to be considered in developing effective intervention and prevention strategies for reducing alcohol-related injury.

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Table 1.

Cause of injuries, DDP and IAPII policy levels among 51 EDs from 22 countries

Region	Country	City/Study, Year	#EDs	N	Traffic ^a	Violence ^a	Fall ^a	Others ^a	DDP	IAPII Policy level
Africa	Tanzania	Moshi, 2013	1	516	375	75	37	29	3	Low
Asia/Pacific	China	Changsha, 2001	1	533	190	118	91	134	2	Low
	India	5 Cities, 2009 ^a	5	2540	573	370	683	920	2	Low
	India	Bangalore, 2001	1	544	92	188	39	228	3	Low
	Korea	5 Cities, 2007–09 ^b	6	2107	489	157	609	861	3	High
	New Zealand	Auckland, 2000	1	153	24	26	52	55	2	High
		Auckland, 2015–16	1	484	57	48	153	229	2	High
	Taiwan	Taipei, 2009–10	2	1035	426	65	253	295	2	High
Europe	Belarus	Minsk, 2001	1	457	18	45	182	217	4	Low
	Czech Republic	Prague, 2001	1	510	39	18	259	195	2	High
	Ireland	5 Cities, 2003–04 ^c	6	2088	188	250	826	831	3	High
	Sweden	Malmö, 2001	1	497	106	35	214	143	3	High
	Switzerland	Lausanne, 2006–07	1	325	74	25	134	93	1	High
North America	Canada	Orangeville (ON), 2002	1	222	29	2	63	128	2	High
		Vancouver, 2009	2	249	14	20	100	116	2	High
		Vancouver/Victoria, 2013–15	3	1191	95	97	449	555	2	High
	Mexico	Mexico City, 2002	1	456	44	72	186	159	4	Low
Central/South America	Argentina	Mar Del Plata, 2001	1	452	104	55	130	163	2	Low
	Brazil	São Paulo, 2001	1	496	82	45	160	213	3	Low
	Costa Rica	San Jose, 2012	2	1013	211	90	433	287	3	Low
	Dom. Republic	Santo Domingo, 2010	1	501	220	95	80	110	2	Low
	Guatemala	Guatemala City, 2011	1	513	120	130	152	143	4	Low
	Guyana	Georgetown, 2010	1	485	86	217	69	116	3	Low
	Nicaragua	Managua, 2010	2	518	110	187	118	135	4	Low
	Panama	3 Cities, 2010 ^d	3	490	103	90	128	184	3	Low
	Trinidad/Tobago	4 Cities, 2015 ^e	4	252	39	56	60	99	2	High

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Region	Country	City/Study, Year	#EDs	N	Traffic ^{<i>I</i>}	Violence ^{<i>I</i>}	Fall ^{<i>I</i>}	Others ^{<i>I</i>}	DDP	IAPII Policy level
Total			51	18627	3908	2576	5660	6638		

^aBeijing, Hangzhou, Chengdu, Hengyang, and Changsha.

^bKyonggi, Seoul, Suwon, Chuncheon, and Donggu.

^cDublin, Galway, Letterkenny, Sligo, and Waterford.

^dLa Chorrera, Colon, and Vearaguas.

^eMount Hope, San Fernando, Port-of-Spain, and Scarborough.

^{*I*} Causes of injuries were not mutually exclusive

Table 2.
Odds Ratios for risk of injuries related to drinking for total injuries and by cause of injury (ref. no drinking)

	Total injury		Traffic		Violence		Fall		Others	
	OR	CI	OR	CI	OR	CI	OR	CI	OR	CI
3 drinks	2.74	(2.41, 3.10)***	2.26	(1.69, 3.03)***	5.72	(4.14, 7.89)***	2.55	(2.03, 3.22)***	2.18	(1.77, 2.69)***
3–6 drinks	5.56	(4.69, 6.59)***	4.38	(2.95, 6.50)***	11.20	(7.67, 16.37)***	5.38	(3.96, 7.30)***	3.87	(2.82, 5.31)***
6.1–10 drinks	8.25	(6.68, 10.18)***	4.88	(2.84, 8.36)***	20.00	(12.58, 31.81)***	6.32	(4.39, 9.12)***	7.11	(4.85, 10.42)***
> 10 drinks	11.04	(8.79, 13.87)***	13.31	(6.87, 25.78)***	26.15	(16.14, 42.35)***	9.38	(6.24, 14.11)***	5.59	(3.71, 8.42)***

 $p < 0.001$

Table 3.
Odds Ratios for risk of injuries related to drinking by Detrimental Drinking Pattern (ref. no drinking)

	Total injury			Traffic			Violence			Fall			Others		
	OR	CI		OR	CI		OR	CI		OR	CI		OR	CI	
DDP = 1 or 2	2.15	(1.83, 2.53)	***	2.21	(1.42, 3.46)	***	5.19	(3.25, 8.30)	***	1.82	(1.37, 2.41)	***	1.75	(1.35, 2.28)	***
3 drinks	4.33	(3.38, 5.55)	***	2.48	(1.35, 4.55)	***	10.54	(5.49, 20.25)	***	4.78	(3.13, 7.31)	***	3.04	(1.96, 4.73)	***
3.1–6 drinks	6.69	(4.76, 9.39)	***	4.95	(2.12, 11.53)	***	27.12	(10.36, 70.98)	***	4.00	(2.29, 6.98)	***	6.30	(3.44, 11.55)	***
6.1–10 drinks	7.28	(4.97, 10.66)	***	6.46	(2.33, 17.95)	***	48.03	(16.31, 141.46)	***	5.52	(2.82, 10.81)	***	3.26	(1.68, 6.31)	***
> 10 drinks															
DDP = 3 or 4															
3 drinks	3.67	(3.00, 4.48)	***	2.23	(1.52, 3.28)	***	6.51	(4.13, 10.27)	***	4.57	(3.00, 6.95)	***	3.01	(2.10, 4.32)	***
3.1–6 drinks	6.73	(5.32, 8.52)	***	6.56	(3.80, 11.31)	***	11.64	(7.30, 18.56)	***	5.90	(3.79, 9.19)	***	4.64	(2.93, 7.33)	***
6.1–10 drinks	9.33	(7.12, 12.24)	***	4.97	(2.43, 10.17)	***	18.02	(10.56, 30.76)	***	8.21	(5.01, 13.48)	***	7.67	(4.66, 12.64)	***
> 10 drinks	13.68	(10.25, 18.25)	***	21.36	(8.73, 52.28)	***	21.51	(12.54, 36.91)	***	12.70	(7.47, 21.57)	***	7.48	(4.38, 12.77)	***
Interaction: DDP 3/4 vs 1/2															
3 drinks	1.70	(1.32, 2.21)	***	1.01	(0.56, 1.82)		1.25	(0.65, 2.41)		2.51	(1.52, 4.16)	***	1.72	(1.10, 2.69)	*
3.1–6 drinks	1.55	(1.10, 2.19)	*	2.64	(1.17, 5.97)	*	1.10	(0.49, 2.46)		1.23	(0.67, 2.28)		1.52	(0.81, 2.87)	
6.1–10 drinks	1.40	(0.90, 2.15)		1.01	(0.33, 3.05)		0.66	(0.22, 2.00)		2.06	(0.98, 4.33)		1.22	(0.56, 2.67)	
> 10 drinks	1.88	(1.17, 3.03)	*	3.30	(0.85, 12.85)		0.45	(0.13, 1.50)		2.30	(0.98, 5.41)		2.30	(0.98, 5.37)	

* $p < .05$ ** $p < 0.01$ *** $p < 0.001$

Table 4.
Odds Ratios for risk of injuries related to drinking by policy index IAPII (ref. no drinking)

	Total injury			Traffic			Violence			Fall			Others		
	OR	CI		OR	CI		OR	CI		OR	CI		OR	CI	
IAPII = Low															
3 drinks	3.23	(2.70, 3.87)	***	2.32	(1.63, 3.31)	***	5.46	(3.77, 7.91)	***	2.30	(1.61, 3.27)	***	3.60	(2.48, 5.22)	***
3.1–6 drinks	6.13	(4.78, 7.85)	***	5.55	(3.39, 9.11)	***	11.37	(6.98, 18.54)	***	5.37	(3.27, 8.83)	***	3.32	(2.02, 5.46)	***
6.1–10 drinks	7.49	(5.37, 10.45)	***	4.20	(2.05, 8.57)	***	17.45	(9.25, 32.92)	***	5.51	(2.67, 11.37)	***	6.73	(3.44, 13.14)	***
> 10 drinks	7.36	(5.33, 10.15)	***	32.12	(9.73, 106.1)	***	10.85	(6.22, 18.94)	***	3.54	(1.86, 6.72)	***	3.48	(1.88, 6.43)	***
IAPII = High															
3 drinks	2.31	(1.94, 2.77)	***	2.04	(1.22, 3.40)	**	6.96	(3.55, 13.67)	***	2.76	(2.03, 3.74)	***	1.67	(1.28, 2.17)	***
3.1–6 drinks	5.12	(4.03, 6.50)	***	2.45	(1.23, 4.87)	*	12.70	(6.61, 24.42)	***	5.67	(3.81, 8.43)	***	4.17	(2.77, 6.30)	***
6.1–10 drinks	8.96	(6.79, 11.83)	***	6.03	(2.52, 14.42)	***	34.58	(15.30, 78.18)	***	7.27	(4.66, 11.33)	***	7.23	(4.51, 11.61)	***
> 10 drinks	14.93	(10.82, 20.60)	***	5.50	(2.37, 12.76)	***	97.91	(37.87, 253.1)	***	15.19	(8.87, 26.01)	***	7.31	(4.21, 12.69)	***
Interaction: High vs low															
3 drinks	0.72	(0.56, 0.92)	**	0.88	(0.47, 1.64)		1.27	(0.59, 2.75)		1.20	(0.75, 1.92)		0.46	(0.29, 0.73)	**
3.1–6 drinks	0.84	(0.59, 1.18)		0.44	(0.19, 1.03)		1.12	(0.49, 2.53)		1.06	(0.56, 2.00)		1.26	(0.66, 2.39)	
6.1–10 drinks	1.2	(0.78, 1.85)		1.44	(0.47, 4.44)		1.98	(0.70, 5.57)		1.32	(0.56, 3.08)		1.08	(0.47, 2.44)	
> 10 drinks	2.03	(1.29, 3.20)	**	0.17	(0.04, 0.74)	*	9.02	(3.00, 27.13)	***	4.29	(1.86, 9.91)	**	2.10	(0.92, 4.80)	

* $p < .05$

** $p < .01$

*** $p < .0001$